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UNITED STATES  
DEPARTMENT OF AGRICULTURE

ARTHUR M. HYDE  
*Secretary*

YEARBOOK OF  
AGRICULTURE  
1932

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## Organization of the United States Department of Agriculture

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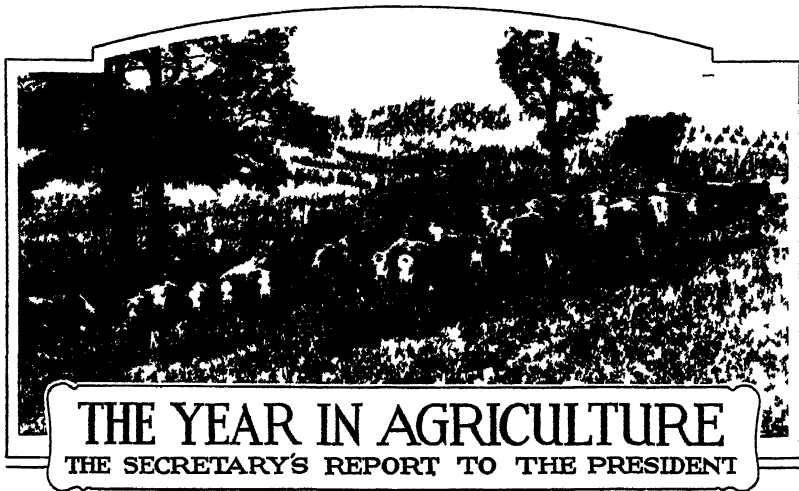
## FOREWORD

THROUGHOUT the civilized world agricultural research is largely a public function. It is so because few individuals or even corporations have the scientific interest, the public spirit, the money, or the personal incentive to do it well. As a private enterprise, it generally does not pay, principally because the benefits can not be monopolized but must be shared with the community. Publicly conducted, however, it pays large dividends. Not to carry on agricultural research would mean neglecting one of the greatest sources of private and national wealth. ¶This sounds like a truism, but it is apt to be forgotten in a period of depression such as that through which we are now passing. It may be supposed that the worth of agricultural research should be judged by the prevailing level of agricultural prosperity. That supposition leads to the conclusion that farm research should be slackened whenever profits fall. One might as well say that an army should drop its weapons at the first reverse. ¶The fact is that agricultural science is never more valuable than when the battle is going against agriculture. It is indispensable at the first line of defense—the cost-of-production line. Agricultural science shows farmers how to reduce their costs not only in production but in marketing. It is at once their protection against excessive loss and their best guaranty of renewed prosperity when the tide turns. Research that lowers production costs is not hostile to production control. True, more units may be produced when unit costs are lowered unless farmers take steps to prevent that development. But they can and should take such steps. Lower costs and production control are not antagonistic but complementary aims. ¶The United States Department of Agriculture is primarily a research institution, with correlated service functions. It presents in this Yearbook, in short popularly written articles, a partial account of its most recent results. For a full accounting ten such volumes would be required. It would be truer to say that a full report, certainly a full report each year, is impossible, because the Department's work is a continuous activity rather than a set of isolated projects pigeonholed in calendar years. What is discovered one year is not necessarily applied at once, though it has a practical application eventually. ¶The information contained in this volume, though constituting only a sample of the Department's latest discoveries and conclusions, bears witness to the practical value of what the Department does. It is a cross section of an immense structure of growing knowledge, cut so that the reader may infer the shape and character of the whole. The volume is the sixth in a series similarly organized. Each article is the work of a specialist. ¶Besides miscellaneous articles published under the heading "What's New In Agriculture," the Yearbook contains groups of articles on important themes. It includes also the Secretary's report to the President and a section giving the most significant agricultural statistics.

ARTHUR M. HYDE,  
*Secretary of Agriculture.*

## CONTENTS

	Page
The Year in Agriculture . . . . .	1
What's New in Agriculture. . . . .	99
Farm Mechanization. . . . .	411
Our Land Use Problem. . . . .	457
Farm Data in 1930 Census. . . . .	479
How to Use Farm Credit . . . . .	501
New Uses for Farm Products . . . . .	513
Fertilizer Developments. . . . .	529
Living Standards on the Farm. . . . .	549
Agricultural Statistics . . . . .	573
Statistics of Grains. . . . .	577
Statistics of Cotton, Sugar, and Tobacco . . . . .	658
Statistics of Fruits and Vegetables . . . . .	695
Statistics of Miscellaneous Crops. . . . .	744
Statistics of Beef Cattle, Hogs, Sheep, Horses, Mules, and Asses. . . . .	770
Dairy and Poultry Statistics. . . . .	825
Statistics of Foreign Trade in Agricultural Products. . . . .	858
Farm Business and Related Statistics . . . . .	886
Miscellaneous Agricultural Statistics . . . . .	914
Index. . . . .	955



WASHINGTON, D. C., *November 14, 1931.*

To the PRESIDENT:

## WORLD INFLUENCES UPON AMERICAN AGRICULTURE

American agriculture is not a separate, but an integral part of the world's economic system, and it is always deeply affected by financial, industrial, and social conditions at home and abroad. It is more affected by foreign conditions than is American industry, because it depends more heavily on the foreign market. When any country, from year to year, has an exportable surplus of a commodity or group of commodities, the prices realized for the export surplus determine the prices obtainable for the whole supply. In the last decade the United States has exported about 13.2 per cent of its agricultural production, and this trade has constituted approximately a third of our total exports. This third, it should be noted, represents only primary agricultural products in their raw or first processed form, such as wheat and wheat flour, and cotton. It takes no account of many agricultural products that are elaborately manufactured and exported as manufactured goods. Cotton manufactures, leather manufactures, numerous chemical products, and many other commodities are excluded. Forest products are excluded also.

Certain branches of agriculture, notably wheat growing and cotton growing, rest far more heavily on the foreign market than do our manufacturing industries. In short, our export trade in farm products brings a large part of the agricultural industry under foreign-market influence. The proportion of agricultural production which is exported is nearly twice as large as the proportion of industrial production exported. Agricultural prosperity in the United States, therefore, depends enormously on the purchasing power of the foreign market. When there is unemployment, a falling price level, and financial disorder in the countries that take our agricultural surpluses, American

agriculture feels the shock of a major depression. Its domestic as well as its foreign market is impaired because reduced foreign buying power means reduced industrial exports and therefore reduced domestic buying power.

These conditions are vital as long as we maintain our present level of agricultural production.

Our agriculture is burdened with surpluses. This has been repeatedly, and, in fact, almost continuously the case since the war. The burden is specially heavy now, not primarily because of great increases over normal production, but as a result of great changes in the demand for our products. The present season, as compared with other post-war years, is one of average total production. Had demand conditions remained as they were in 1929, the output in many lines presumably would have been absorbed without disastrous price recessions. Demand has declined to such an extent, however, that many branches of our agricultural industry lack a profitable outlet. Lines that were materially overexpanded before the crisis are in desperate straits now. When supply already exceeds requirements, a sharply falling demand makes it intolerably burdensome.

Why has agriculture's surplus problem become thus aggravated? And from what source or sources may relief be expected? Correct formulation of agriculture's basic problems is essential, for mistaken diagnoses lead to mistaken policies, public and private. Concretely the issue is whether agriculture faces a temporary or a permanent change in its general market situation. In either case, changes in its production will be necessary. But the kind and degree of these necessary changes should be determined by market trends. Explicitly our farmers will have to decide whether it will pay to produce as heavily for export as they have recently. This is the critical point because, as already noted, the foreign market exercises a decisive influence upon the profits of several major branches of American agriculture.

### Relationship to European Market Changing

Our dependence on the foreign market arises, of course, from the fact that American agriculture was evolved largely as a source of supply for an expanding industry in other countries, particularly in Europe. In the last two decades this relationship has changed vitally. Changes no less important impend. American agriculture must adjust itself thereto, if it is to be prosperous. Many factors are involved. The most important, as already indicated, is the influence of the foreign market on prices both at home and abroad. Scarcely less important are long-time trends in foreign-market requirements, foreign purchasing power, and foreign competition. International relationships in industry and trade, as well as in agriculture, enter the situation. In former years mutually profitable exchanges between Europe and the United States were possible because this country needed Europe's industrial products and could take them in exchange for grain, meat, and fibers. But our own industry has grown beyond the needs of our domestic market. To-day we wish to export rather than to import industrial products. Furthermore, Europe now has other sources to which it can turn for agricultural goods. It is poor business to shirk facing such facts. Farmers should understand them because exceptional circumstances, most of them an outgrowth of the war, have stimulated our export trade in agricultural products far beyond the

level to which it would have tended had the war not thrown events out of their natural course.

Main trends in our changing relationship to the foreign market can be described briefly. In the nineteenth century the relationship of American agriculture to its foreign market was favorable. From 1870 to 1898 our agricultural exports, particularly in cereals, livestock products, cotton, and tobacco, mounted tremendously. These commodities went chiefly to the thriving industrial nations of Europe, whose growing populations became dependent on outside sources of supply. Excluding forest products, our agricultural exports rose from about \$297,000,000 in 1870 to more than \$840,000,000 in 1900. Expressed in an index of volume using the period 1910-1914 as 100, the export index number for 1870 was 25. For 1900 it was 122. The highest point was reached at 136 in 1898. Then a decline began that continued until the World War. We were approaching a balance between the domestic supply of, and the domestic demand for, agricultural products.

It is significant that the most prosperous period of American agriculture was not the era of rising exports, which in fact included years of ruinously low prices. Rather, the period (1898-1914) of declining exports was the prosperous time. Though we can not say that the decline in exports was the cause of the rise in prices, it obviously proved compatible with the advance. Agricultural prices rose more than the prices of other goods, and the rise was reflected in a rapid and steady increase in agricultural wealth. The average valuation of farm real estate in the United States doubled from 1900 to 1910, and the gain continued at an increasing rate until the war.

### Why Farm Exports Dropped Before the War

Our agricultural exports declined before the war for two principal reasons. In the first place, they declined because the United States market increased. Growing consumption at home more than compensated for the decline. Our population increased from 73,000,000 in 1898 to 98,000,000 in 1914, and became more concentrated in cities. The standard of living advanced. Our national wealth, according to the census, increased from \$88,500,000,000 in 1900 to \$186,300,000,000 in 1912. In the same period wealth per capita of the population rose from \$1,165 to \$1,950. This was a period of rising prices, hence the gain in real wealth was somewhat less than the indicated gain in money values. It was substantial, nevertheless and brought about a more rapid increase in our consumption than in our production of the principal agricultural commodities, though this production increased rapidly. Accordingly agriculture had favorable supply and demand relationships despite its loss of ground in the foreign market.

In the second place, our customers abroad turned increasingly to other sources of supply; to Canada, Argentina, and Russia for grain; to Argentina for meat; to Australia and New Zealand for sheep and dairy products. Foreign countries, with cheaper land and most of them with cheaper labor, were competing with us in the importing markets. Countries in the pioneer stage of agricultural development had advantages comparable to those enjoyed by the United States in its earlier history. In consequence, our farm-commodity exports, including cotton, dropped about 36 per cent from 1898 to the period 1910-1913.

### Trend Reversed in War Period

This whole situation, which seemed to promise stable prosperity for agriculture, was profoundly altered by the war. Our agriculture was expanded to meet war-time needs, and the trend toward a lessening dependence upon the European market was speedily reversed. When the war eliminated Russia from international trade in agricultural products and reduced the production of most European countries it gave an immense impulse to production elsewhere. In the United States, Canada, Argentina, and Australia the cereal acreage in 1921 was nearly 20 per cent greater than before the war. Canada's wheat acreage more than doubled. Pork production in the United States, beef production in Argentina, and dairy production in Argentina and New Zealand were tremendously stimulated. By 1918 our own farm-commodity exports, including cotton, reached a point 45 per cent above the pre-war level. More American beef, pork, and cereals were exported to Europe than were sent there at the height of our agricultural export trade in the nineties. From the standpoint of our permanent agricultural interests, this was a hazardous development, which left us with enormous surplus-production capacity.

Surplus production persisted long after the need that called it into existence had passed. Though our agricultural exports decreased in volume after the war from 145 per cent of the pre-war level, the high point reached in 1918-19, to 104 per cent of the pre-war level in 1923-24, they advanced to 136 per cent of that level in 1926-27. In the crop year 1929-30 the volume of our agricultural exports was 97 per cent of the prewar level. Many products, however, were still exported in volumes much exceeding the pre-war averages. Our net exports of grain and grain products in 1929-30 had declined greatly but were still 130 per cent of the pre-war level. Exports of cattle and meat products remained above the pre-war level.

### Effective European Demand Overshot

Even had Europe regained its pre-war purchasing power it would not have been a profitable market for all the surplus farm production we had to offer. For one reason, other countries were offering large surpluses there, too. In 1921 exports of pork from all the principal surplus producing countries were 80 per cent greater than before the war. Total exports of beef from the surplus countries were 63 per cent greater than before the war, of butter 104 per cent greater, and of cheese 30 per cent greater. At the same time, Europe was restoring its domestic agriculture. Recovery came first in Denmark and the Netherlands, which were disturbed by but not directly involved in the war. Next, the former warring nations of Europe increased their output. By 1927 the cultivated area of Europe, outside Russia, was back to 97 per cent of the pre-war average. Europe's production of milk, butter, cheese, and pork was above the pre-war level. By 1930 Russia had resumed the exportation of cereals and other agricultural products. In such circumstances even a prosperous Europe would probably have desired less of our farm production than it took before the war. In the hard conditions of the postwar period, it desired much less. True, it took large quantities; but it did so at bargain prices, which returned little or no profit to our producers.

The war, in short, left American agriculture excessively dependent on the European market. Europe's capacity to take American agricultural goods depends essentially on three factors: Its purchasing power, the volume of its own farm production, and the quantity of farm production available to it from other sources. When we compare Europe's present condition with its pre-war prosperity, and consider also the increased competition our farmers meet there, it is obvious that our agricultural exports are still too large. In the contraction of our farm exports from 1900 to 1914, American farmers, as already noted, suffered no harm. They suffered acutely from the decline after the war. This contrast is easily explained. In the pre-war period our farm production, though it steadily increased, did not increase more than the total market, domestic and foreign. In the postwar period, on the other hand, the production increased much more rapidly than the market, and corresponding increases took place in other agricultural countries. As a result of technical progress, farm output per man engaged in farming in the United States jumped about 15 per cent between 1919 and 1924, and it has increased since. Meantime acreage has increased. Yet not only the foreign market, but the domestic market has weakened, partly because the population is increasing less rapidly than formerly. In the present downward trend of our agricultural export trade, the home market has relatively more slack to take up than it had before the war, and less capacity to do it. Hence the favorable supply and demand relationships that existed then can not be restored without sweeping adjustments in production.

#### Export Decline Retarded by Credits

This country's agricultural exports to Europe after the war would have fallen more had not the trade been supported by a liberal credit policy. It depended extensively on American capital loans. Nearly half the \$10,500,000,000 loaned by the United States Government to foreign governments was loaned after the war. Loans by private investors after the war came to nearly the same sum. All told, American capital loans to foreign countries, mostly European countries, between 1914 and 1930 aggregated approximately \$23,500,000,000. These advances financed an export movement of industrial as well as of agricultural goods, but in the trade with Europe the agricultural goods predominated. Even with its purchasing power thus augmented, Europe was obliged to curtail agricultural imports. It raised tariffs and adopted milling restrictions to limit dependence on grain imports. It substituted vegetable for animal fats and oils. When in 1929 the stream of American credit to Europe dwindled, Europe was forced to cut its agricultural imports still more. Europe's credit difficulties have reacted vitally upon our agricultural export trade, which can not continue as if nothing had changed.

#### Monetary Factors in the Depression

Still another aspect of the international credit situation reacts adversely on our agricultural export trade. Before the war the United States was a debtor country, and foreigners owned much of the capital invested in our factories and farms. Our chief creditor was the United Kingdom; other countries, however, had substantial investments in the United States. It was necessary for us to pay

interest on the borrowed capital and to liquidate some of the principal. This was accomplished chiefly by the exportation of goods. Our debtor status, in its later stages, produced a heavy balance of United States exports over imports. This did not embarrass the creditor countries because in effect they had paid in advance for much of what we had to send abroad. It is different now. In the war period we paid off our debts and became a creditor country. As a consequence our balance of exports over imports, though it continued, became utterly changed in character. Instead of being a net addition to the current income of the principal importing countries, it was a charge against their future income. It put them in a fiscal position similar to the one from which the United States had emerged. It obliged them to work toward exporting more than they imported. Since they found it difficult to increase their exports, they had to cut down their imports. This necessity will continue as far ahead as we can see. It can not, for obvious reasons, be met as easily as the United States met a similar necessity when this country occupied a debtor rôle. For one thing, the United States does not need what Europe produces as urgently as Europe formerly needed what this country produced. In other words, the Old and the New World are now less favorably placed to exchange goods and services. Each hemisphere is well developed industrially, and deficits are substantial only in Europe's agricultural wants. True, these deficits must be met. But whether they will be met in ways advantageous to the farmers of the United States is a question. Since we do not require Europe's industrial surpluses, Europe may be forced, in large measure, to do without our agricultural surpluses.

Another factor in our agricultural problem lies in Europe's monetary disorders. When Great Britain and other countries resumed gold payments in 1925 and 1926 they released forces that redistributed the world's gold supply. Surpluses accumulated in creditor countries while debtor countries ran short. When gold-standard countries have insufficient gold, they contract their currencies and credit. This causes prices to fall. American agriculture would have been hurt even had it avoided expansion in production. But this should not blind us to the additional handicaps that result from unrestricted production. It is difficult to measure the relative influence of the monetary and the nonmonetary factors in the present crisis. Both, however, are important. Agriculture's attention is properly centered upon the latter because they are measurably within its control. Unless production is adjusted, low agricultural prices will continue after Europe's money troubles are remedied.

The part played by general deflation in the agricultural depression has caused some persons to declare that underconsumption rather than overproduction is the main trouble. This is a distinction merely of words. The surplus is the important thing. Whether created by overproduction or enhanced by underconsumption, the supply controls.

### Two Fundamental Requirements

The situation has two fundamental requirements. First, the credit and purchasing power of Europe must be restored. This is essential not only for European welfare but for our own, because we shall need the foreign market indefinitely for some of our products. Second, American agriculture must adjust itself to a declining export trade.

As things stand, this need will persist, no matter how favorably matters develop in Europe, because our production is overexpanded in relation to Europe's wants. Should Europe's economic recovery be slow, the necessity for diminishing our farm exports will be the more pressing.

This is not a policy of defeatism, a passive acceptance of declining business. It is a policy of constructive adjustment to a radically changing market situation. What counts in agriculture is not primarily the volume, but the profitableness of farm production. It is better to contract the agricultural industry profitably than to overproduce unprofitably. Here is the challenge of the present situation. In a market that does not keep pace with the increase in production capacity farmers must adjust their production. If they do this by withdrawing the less productive acres and livestock, they reduce their surpluses and often also their costs of production. Thus they reap a double advantage. They get higher prices and also benefit from wider margins between prices and costs. This favorable margin can be increased by individual efficiency. I discussed the necessity of crop adjustments in my report last year (pp. 24-30) and need not repeat here what I then said. It is a gross error to suppose that efficiency in agriculture leads inevitably to overproduction. It tends on the contrary to promote a good adjustment between supply and demand, because it discourages wasteful competition. It is time to revise the crude notion that only a continually expanding agriculture can be a profitable agriculture. Expansion is justified only when the market is expanding too. When the market is declining or is not expanding at its former rate agricultural profits wait upon adjustment to the change. Effecting this adjustment does not mean abandoning the market to our competitors. It means producing for a real as distinguished from an illusory market, and supports the advantages this country possesses in natural resources, capital, and managerial ability.

This recommendation to reduce the volume of our agricultural exports does not challenge the ability of our farmers to meet foreign competition. They can produce, with or without tariffs, as cheaply as farmers anywhere. But to do so they would have to accept lower living standards.

### Surplus Difficulties Largely Export Difficulties

Overproduction is not necessarily and invariably production for export as distinguished from production for the domestic market. It is possible to have an oversupply of goods that are essentially on a domestic basis, such as dairy products and wool, as well as of goods produced largely for export. Taking our agriculture as a whole, however, it is surely true that surplus difficulties are now largely export difficulties. The farm commodities that we sell heavily in foreign markets are those that are depressed most seriously. Wheat and cotton are conspicuous examples.

In urging an agricultural policy directed toward lessening our dependence upon foreign markets we do not ignore the relationships in which different leading products stand toward the export demand. With some products, such as cotton, we have natural advantages that give us competitive strength in international trade. With other products, such as wheat, our position is less advantageous. No uniform prescription can be given as to the place that different commodities should occupy in the export trade. But if a declining agricultural export

trade was compatible with American agricultural prosperity before the war, when foreign competition was relatively weak, and when foreign purchasing power was rising, it is much more in order now.

### Rapid Shift to Domestic Basis Impracticable

The surplus-production capacity that American agriculture now has can not be quickly eliminated, and a sudden shift from an export to a domestic basis is not practicable. Some branches of our agriculture, moreover, can compete successfully in foreign markets, even against the pressure of world-wide overproduction. Exclusive of that grown in China, this country, for example, produces about 60 per cent of the world's cotton crop; the economy of specialization in cotton as a cash crop supplemented by home-grown food and field crops, gives many of our growers an advantage even in bad years. The tobacco situation is similar. Excluding Russia and China, the United States produces about 40 per cent of the world's tobacco crop and holds a dominant position in the international trade. It does not follow, however, that unrestricted production of these crops for the export market is warranted. Cotton and tobacco prices, as well as the prices of cereals and meat products, reflect foreign-market influences significantly. There is no profit in persistent overproduction for a declining foreign demand. Our producers may be able to stand the loss as well as any of their foreign competitors, but it is poor business to do so unnecessarily. They should grow the quantity of each crop that can be absorbed, with profit to themselves, either in the domestic market or the foreign market, or in both. When wheat sold at \$1 or more a bushel in western markets, thousands of producers could grow it profitably for export who can not do so at present prices. Their production in recent years has evidently been adjusted to the prices previously received. It could have been more desirably adjusted to price prospects.

With human wants still unsatisfied, overproduction seems an anomaly. Farmers, however, cannot produce for a market that can not buy. They must realize a profit. Agriculture throughout the world has persisted since the war in increasing its production beyond the purchasing power of the available market. This is competition run amuck. It brings no benefit in the long run even to the purchaser, because the distress inflicted upon agriculture hurts other industries, limits their markets and their profits, and forces them to lay off workers. Trade depression such as the world has gone through in the last two years emphasizes, though it does not create, the disparity between agriculture's production capacity and its market. It stresses the folly of production without reasonable prospect of a profitable sale. Agriculture can not shut down as manufacturing industries sometimes do when demand falls off; but this does not mean that agricultural production should continue to disregard market developments. Reducing farm production may often be difficult and sometimes costly, but its difficulty and its cost will certainly be less than that of continuing production on a scale in excess of demand.

### Home Market's Importance Not Minimized

This is not an attempt to minimize the importance of the domestic market. We merely emphasize the influence of foreign conditions upon some of our principal crops. If a surplus must be sold abroad,

the price falls in the domestic market to a point at which foreigners will buy. This explains why foreign takings have a greater influence on prices than their proportion to the total supply would indicate. No device can be a remedy which tends to increase exportable surpluses. Actually to reduce these surpluses is the only logical course. They can not be forced into unwilling markets.

There is a reverse side to the picture. American agriculture is not wholly on an export basis. Many of its products find a sufficient market within our borders. But this fact, though it may mitigate, does not destroy the influence of the export surpluses. Commodities that can not be profitably exported may sometimes be substituted at home for products not ordinarily exported, as when wheat replaces corn as feed for livestock. In this way the market for commodities usually on a domestic basis is weakened. Furthermore, slow export trade may prompt farmers to shift their crops so that overproduction may result in crops ordinarily produced exclusively for home consumption. Thus export surpluses tend to weaken the whole structure of agricultural prices. In such conditions an expanding home market lacks the beneficial influence it would otherwise have. No one can tell what the ultimate position of American agriculture in world trade will be. Developments not now foreseen may change matters radically. New foreign markets may be developed, and old ones may be recaptured through technical progress. Present conditions, however, certainly indicate that smaller production for export would mean a more profitable American agriculture.

### The Influence of the Tariff

As we produce less for export, the tariff on agricultural products will become more effective. Agriculture will benefit in two principal ways. It will share in the results of a better adjustment of world production to world demand, and will have a stronger, more sheltered domestic market. Tariff protection is of course indispensable to this latter result. Prices can not be higher at home than abroad unless tariffs stand between the domestic and the foreign market. Tariff protection for agriculture is part of our national policy. There is no reason to fear that it will be discontinued. It is already effective for many crops formerly governed entirely by the world market, and covers a progressively larger proportion of our agricultural output. The advantage is not confined to crops definitely and permanently on a domestic basis. It extends to crops still produced substantially for export, because it lessens the incentive to produce these crops in excessive quantities. Farmers have an increasing number of sheltered crops to which they may turn.

The tariff act of 1930 accorded well with agriculture's needs, both present and future. It increased the rates of duty on agricultural products about 30 per cent. This change, besides strengthening the home market for many products already on a domestic basis, enabled farmers to put additional products in a similar position. The new rates helped agriculture materially. Practically all our agricultural imports, both dutiable and free, declined under the influence of the depression. But the dutiable imports declined much more than the free imports. In the 12 months following the passage of the act our imports of dutiable agricultural products fell off by 33 per cent, whereas our imports of duty-free agricultural products declined only 7 per

cent. This difference was clearly, in large part, a result of the new tariff. The world's difficulties would not otherwise have caused so unequal a decline. Had the new tariff law not been in effect, world competition would have been felt by our farmers disastrously in the domestic as well as in the foreign market.

No fiscal policy can guarantee agricultural profits in a time of depression. A tariff is justified if it diminishes losses. By this test the tariff act of 1930 is already a demonstrated benefit. Its benefits should be substantial when economic conditions once more become normal. The tendency, then, as has already been indicated, will be toward increased dependence on the home market. As export surpluses diminish, American standards will become effective on a steadily lengthening list of farm commodities. Agriculture and manufacturing industry in the United States are exchanging rôles in relation to the world market. The former is becoming less and the latter more dependent on export trade. Only the tariff can make this change beneficial to agriculture. On a long view its potential advantages far outweigh its present advantages, substantial though these are.

### HOME MARKET AND FARM INCOMES

When surpluses can not be sold abroad they pile up at home. Economic depression abroad can throw many branches of our agricultural industry into distress; when such depression is associated with like conditions in the United States, all agriculture is affected.

In the last year the domestic demand for farm products has declined to an extent rarely before equaled in so short a time. This is mainly traceable to changes in the level of industrial activity, which changes are the most important single cause of fluctuations in the home market for the agricultural goods. In the 1929-30 season industrial production in the United States fell about 20 per cent below the level reached in the preceding year. A further decline of nearly 20 per cent took place in the 1930-31 season.

Money incomes of factory workers declined more than the volume of industrial production. This reduction, besides involving an enormous cut in the purchasing power of wage earners, reflected a decline in the buying power of other urban groups, since it betokened reduced industrial profits. Wholesale and retail trade and the professions were damaged proportionately, with bad effects upon the farmers' markets. Some groups with more or less fixed money incomes found their purchasing power increased through falling prices, but the trade slump caused a heavy net drop in the purchasing power of the Nation as a whole.

#### Agricultural Prices Decline Most

Trade depression invariably causes agricultural prices to fall sooner and lower than the prices of other goods. This tendency, which was painfully in evidence in the depression of 1921, received a new demonstration in 1930 and 1931. In a general price decline such as that which has affected practically all commodities in the last two years, agriculture would be injured even had its prices not fallen more than those of other economic enterprises. Falling prices always mean falling profits, since costs of production never decline proportionately at once and usually not for a long time. The injury to agriculture is greatly increased by the excessive degree to which farm commodities

have been affected. Special interest attaches to this aspect of the problem because it suggests part of the remedy. When agricultural prices fall more than other prices, the fact shows, among other things, that agriculture is having more difficulty than other industries in readjusting its production.

### Causes of the Disparity

Such disparities tend to disappear as business revives. Farm prices which fall faster in depressions rise faster in recoveries. The disparities arise in periods of depression from the fact that farm production is not easily or quickly adjusted to market changes, whereas the output of many nonagricultural commodities is adjusted promptly. In agriculture, production continues to overshoot demand; in industry, on the other hand, the maladjustment between supply and demand shows itself in unemployment rather than in a persistent accumulation of commodities. Hence, agriculture is penalized unavoidably. Its readjustment difficulties are intensified by the fact that other economic enterprises solve such difficulties by methods that weaken the farmer's market. Another factor in widening the spread between agricultural and nonagricultural prices is the difference in competitive conditions in agricultural and in industry. The prices of practically all agricultural products reflect changes in demand conditions quickly. On the other hand, the prices of many nonagricultural products are more or less customary, and depend largely on elements other than those springing from the immediate business situation. Then, too, agriculture is handicapped by relatively great difficulty in reducing its overhead costs. All these circumstances are finally expressed in a lagging agricultural adjustment to the diminishing market. Crop shifts take place, but agricultural production as a whole tends to be maintained. Our total acreage this year is about the same as it was last year; on this acreage we are producing surpluses that demoralize the markets and return no profits to farmers.

Price changes, absolute and relative, are not the only factor in determining farm incomes. It is necessary to consider also the volume and the cost of production. Fairly comprehensive statistics are available as to the volume, but not as to the cost of production, which varies greatly on different farms and in different regions.

### Gross Returns From Farming

Some measure of the decline that farm earnings have suffered in the last two years is afforded, however, by data available as to the gross return from agricultural production. Gross income from the agricultural production of the United States for 1929 was about \$11,911,000,000, and in 1930 about \$9,347,000,000. It is not yet possible to state the gross income from the farm production of the current season. On the basis of figures heretofore available it may be less than \$7,000,000,000. The recent upturn in prices will of course affect the estimate.

At this writing (November, 1931) some of the principal crops are not yet completely made, and the marketing season has several months to run. Certain broad conclusions are indicated. Thus, in the first eight months in the calendar year livestock and livestock products were marketed in about the same volume as in the corresponding period of 1930, but the prices were very much lower. On October 15,

1931, the prices received by farmers for this group of commodities averaged 36 per cent below those of the corresponding date in the previous year. The prices of dairy and poultry products were 21 per cent lower.

In 1930, the last year for which complete data are available, gross income from grains was only \$760,000,000, as compared with \$1,281,000,000 in the previous year. Gross income from cotton dropped to \$748,000,000, as compared with \$1,389,000,000 in 1929. Income from meat animals was about \$2,455,000,000, as against \$2,817,000,000 in 1929. All livestock and livestock products brought a gross income of \$5,296,000,000, or about 15 per cent less than in the previous year. The corresponding reduction in the income from field crops was about 48 per cent. Net income from agricultural production in 1930 declined proportionately more than the money incomes of factory employees and considerably more than the incomes of certain other groups.

Net returns to producers, which are what is left after deducting the expenses of production, unquestionably declined proportionately more than the gross returns. In field crops, prices declined proportionately much more than the production increased. Grain production is only moderately greater than it was last year, yet grain prices on October 15, 1931, averaged about 50 per cent below those of October 15, 1930. Cotton production is about 22 per cent greater than in 1930, yet cotton prices on October 15 were 45 per cent lower than on the corresponding date of the previous year. The production of fruits and vegetables increased somewhat; the prices of these commodities averaged about 45 per cent lower. At the prevailing price levels, the year's increased volume of production not only failed to prevent the gross farm income from declining below that of the previous year, but did not prevent it from falling below that of the depression year 1921.

### Effect on Net Incomes

Some small compensation for price declines has come to the farmers during the last few years in the shape of reduced production costs. In 1930, and to a still greater extent this year, necessary expenditures for labor, fertilizer, farm equipment, machine supplies and repairs, and feed and seed declined. Farm wages and prices of the goods used in farm production were about 15 per cent lower this fall than last fall. As already indicated, however, the expenses of farm production tend to decline less rapidly than the prices of farm products. Against a 15 per cent drop in certain leading farm expenditures, it is necessary to set a possible 25 per cent drop in gross farm income in 1931. Furthermore, not all the reductions that take place in farm expenses go on the credit side of the agricultural ledger. Feed and seed, for example, are bought by some farmers and sold by others. Thus gain to one group is offset by loss to another. Savings on labor, machinery, oil, gas, tires, etc., are, of course, actual net savings to agriculture. They do not suffice, however, to offset the tendency of other farm expenses to remain fixed in time of depression. Taxes do not fall with farm-commodity prices nor do interest charges and principal on mortgage debt. When the purchasing power of farm commodities falls as much as it has since 1929, the proportion of the farm output that must be surrendered in payment of taxes and principal and interest on loans increases. Perhaps the heaviest burden that depression puts on agriculture is the difficulty it creates in meeting fixed charges.

Reductions in the expenses of production have not nearly sufficed to counterbalance the drop in gross incomes. Hence the net income of the farmers from the production of 1930 declined proportionately more than the gross income. It fell short of providing a wage allowance for the farm operator's labor at going farm-labor rates, and left no net income whatever available for the farmer's capital or management.

### Adjustment to Main Trends Imperative

Agriculture, if it is to be continuously profitable, must be adjusted to long-time trends. This fundamental requirement is far more important than the need to vary farm output with temporary market changes. It is desirable, of course, to match temporary market shifts with corresponding adjustments in output. It is imperative to make adjustments to long-time changes. When main trends turn against agriculture, the penalty for failing to adjust output is disaster. It does not follow, simply because a certain volume has been absorbed not unprofitably for a number of years, that a sound balance has been struck. Possibly the production has been continued for a market essentially precarious. This is potential overproduction which may turn suddenly into actual overproduction. Even when business becomes active again, a brake will have to be kept on some branches of American agriculture.

### CROP ADJUSTMENTS MADE BY FARMERS

Extensive crop shifts have been made by the farmers of the United States in recent years. Unfortunately these shifts have not gone far as yet toward adjusting production to consumer demand. Contraction in some regions has been offset by expansion in others, particularly in wheat and cotton. On the whole, expansion has exceeded contraction. This is so plainly against the interests of the farmers that careful study of the question is necessary to indicate how crop adjustments may be better engineered. The best way to see what is required is to note the results of what has already been attempted.

Net farm incomes have been so low since the war that the farmers might have been expected to reduce their acreage. Instead they increased it. In 1930 the United States had 366,500,000 acres in crops, the highest total on record. This was an increase of 55,000,000 acres since 1909. Lessening demand for farm products, at home and abroad, and repeated warnings against overexpansion did not prevent the 1930 crop area from increasing 2,000,000 acres over that of 1929. The increase over the 1909 figure is specially remarkable since the last 12 years saw a decline of about 8,500,000 head of horses and mules on farms and a consequent release of approximately 20,000,000 acres (not including pasture) formerly required to produce feed for work stock. Land thus released, which previously produced raw material for animal power, now produces foodstuffs for the market. Wheat acreage, which rose from 44,262,000 acres in 1909 to nearly 75,694,000 in 1919, dropped after the war to 52,535,000 acres in 1924, but rose again to 61,464,000 acres in 1929. The acreage for harvest this year, despite the low prices that prevailed for wheat during 1930, was reduced only about 6 per cent below the 1929 level.

### Regional Changes Conflict

Regional aspects of the wheat-acreage problem show the difficulty of getting concerted action when reduction is desirable. In the region east of the Mississippi wheat acreage dropped from about 18,000,000 acres at the close of the war to about 11,000,000 acres in 1930, or to a point below the pre-war level. West of the Mississippi, however, tremendous expansion occurred, particularly in the southwest winter-wheat States. Kansas's wheat acreage this year is estimated at 12,572,000 acres, as against 4,810,000 in 1911. Montana last year harvested 4,000,000 acres of wheat, as compared with less than 1,000,000 acres in 1914. The aggregate wheat acreage of Colorado, Nebraska, Texas, and Oklahoma in 1930 was 11,400,000 acres, as compared with about 7,800,000 acres in 1914. Reductions in the East, where farmers can turn to other crops, were more than offset by increases in the West where crop shifts are difficult.

Equally striking is the way in which cotton acreage reductions in one region were offset by expansion in another. In the old Cotton Belt, where the boll weevil did heavy damage in 1921, 1922, and 1923, cotton as the principal cash crop was wiped out in some sections, and some cotton land went entirely out of production. In the weevil-infested area generally cotton was widely replaced by feed crops and pasture. In the cotton States east of the Mississippi the acreage in truck crops increased, from 1919 to 1930, about 154 per cent. West of the Mississippi, particularly in Texas and Oklahoma, the cotton area increased greatly. Texas and Oklahoma together had 23,000,000 acres in cotton in 1926, as compared with 12,900,000 acres in 1919. This year the cotton acreage in these two States is about 3,500,000 acres below the 1926 figure. Our total harvested cotton area in 1930 was 45,218,000 acres, as against 33,566,000 acres in 1919.

### Corn Acreage Remarkably Uniform

Our corn acreage has been remarkably uniform at about 100,000,000 acres for several years. Though the acreage in corn this year is the largest since the record acreage of 1917, it is only 8.6 per cent above the lowest acreage in the last quarter of a century. Corn acreage is relatively stable because the crop returns a comparatively large gross income per acre under a wide range of climatic conditions. Nevertheless, regional adjustments take place. Corn has moved west and north in the last decade. A reduction of about 5,200,000 acres east of the Mississippi has been offset by an increase of about 7,800,000 acres in Minnesota, North Dakota, Iowa, South Dakota, and Nebraska.

Flax acreage increased from 1,113,000 acres in 1922 to 3,692,000 acres in 1930, to some extent at the expense of wheat and grass. The production of truck crops and vegetables (not including potatoes) has increased at an average rate of about 10 per cent a year since 1921, though in the last few years the outlook for these crops has not been satisfactory. Vegetable and truck-crop production, however, can be increased greatly without drawing much land from other crops.

When major crops are overproduced, the difficulty may be mitigated but can not be overcome for the country as a whole by changing to minor crops. Six major crops have a combined acreage which usually makes up more than 85 per cent of the total crop acreage. These crops are corn, hay, wheat, cotton, oats, and barley. Only about 46,000,000

acres, or less than half the area we devote to corn alone, is used for producing 70 or more minor crops. It is obviously impossible to change largely from the production of these major crops to the production of the minor crops without disturbing the market for the latter. Sizeable acreage adjustments among the major crops necessitate either changing from one major crop to another, abandoning crop land, or increasing the area in pasture. Shifting acreage in the major crops is practicable only when some of them are in short supply. Abandonment of acreage, though large in recent years, may be offset by expansion elsewhere. Returns from most pasture are relatively so low that a change from crops to pasture is a last resort where land is good. All the courses open are difficult, a fact which largely explains the tendency of farm production to stay above market requirements when demand falls. It is a tendency that must be combated if farm profits are not to vanish altogether in a period of rapidly falling prices. Temporary abandonment of farm land in extreme situations is preferable to farming it at a loss. The individual farmer faces many practical difficulties in adjusting production, as will be pointed out presently. The main problem is one of reconciling individual interest to group interest through concerted action of producers.

### Adjustments in Livestock Production

Changes in the production of livestock can not be made as quickly as changes in the production of field crops, though the output of some livestock products can be changed quickly. Shifts in hog production mainly go in cycles, but depend on shifts in field crops, and also on changes in the use made of crops. Dairy expansion in the Eastern States in recent years has gone along with a decline in hog numbers in that area. On the other hand, hog production has increased where corn has replaced wheat and other crops. Hog producers have partly met the challenge of declining prices by increased efficiency both in swine sanitation and in the utilization of feed. In the beef-cattle industry, which has a long production cycle, adjustment to declining prices is extremely difficult. Since 1928 the number of cattle on farms has increased from 55,500,000 to 59,000,000, despite warnings that increased production would mean lower prices. The greatest increase has taken place in the North-Central States, where pasturage, roughage, and grain are most abundant. Production is at last being curtailed in the sheep industry, whose output expanded 43 per cent between 1922 and 1931. The expansion was general in all sheep-producing sections and continued despite numerous warnings that overproduction impended.

### Outlook Service

Such facts show that attempts of farmers to shift their production to better paying lines are often confused and conflicting. Better facilities for concerted action are needed. Some progress has been made in developing such facilities. There is growing solidarity among farmers in the cooperative movement and in various other forms of organized effort. There is also rapid growth in the use of economic information as a basis for cooperative adjustments. The Department of Agriculture collects and interprets the data needed. This service deals not only with the supply of and the demand for various products, but also with farm-management problems. Too often farmers adjust their production on the basis of currently received prices or prices received in the

preceding year, apparently in the mistaken belief that similar prices will necessarily continue. This practice is a basic cause of cyclical fluctuations in production. Alternate expansion and contraction result in wasteful crop and livestock shifting.

Farmers must take into account a complexity of forces in planning their production program. They can not supply themselves with the necessary information and its interpretation. This fact, and the public importance of adjusting production to demand, make the task of supplying outlook information a public function. The department began systematically to meet this need eight years ago, when it established an outlook service. The service has become a cooperative undertaking between the department and State agencies.

It is planned in national, regional, and State conferences. The resulting information is made available to producers in all parts of the country, through published reports, press material, radio addresses, and direct contacts with farmers. In 1930 six national and regional conferences were held, with nearly 400 State specialists in attendance. Forty-five States issued special outlook reports supplementing the department's data and interpretations with information specially pertinent to particular States and local areas. Nearly 1,300 meetings were held for training local leaders in this work, as compared with 540 such meetings in 1929. Also 9,135 farmers' meetings, with an aggregate attendance of 601,000, were held to disseminate economic information, as compared with 4,240 such meetings with an attendance of 204,000 in 1929.

Economic information is meeting a rapidly growing demand in vocational education. In the last fiscal year approximately 95,000 farmers were enrolled in evening classes, as compared with 65,000 in the preceding year. Those in charge of this work in the Federal Bureau for Vocational Education cooperate with specialists in the Department of Agriculture. Economic material has an important place in the instruction.

Regional differences in soil, topography, and climate, and in other factors of fundamental importance in shaping types of farming and trends of production, are recognized by the department and the State agencies in their research and extension work. In farm-management investigations a beginning has been made in determining differences in types of farming and in organizing research into regional programs.

### Compulsory Adjustments Inadvisable

I have repeatedly emphasized the need for curtailing acreage and livestock breeding, and have urged that this be done by voluntary concerted action. This course seems preferable to the compulsory production control lately advocated in the cotton States. The doctrine that production can be better controlled by law than by the judgment and decisions of producers is probably repugnant to our Constitution and certainly repugnant to the character of our economic system. Production adjustments are more necessary now than they were a year ago. Appeals made then for voluntary concerted action met with an inadequate response. It has been inferred that voluntary action must fail unless supported by legal action. This does not necessarily follow. Acreage cuts and reductions in livestock breeding were relatively small last year, probably because farmers were not then convinced of their urgent necessity. The situation has changed so

much since that it seems impossible to doubt that they are convinced now. If they are, voluntary action should do what is required. If they are not, legislative action will meet with resistance.

All plans for general cuts in production meet the difficulty that farm production costs vary on different farms and in different localities. Hence prices that mean loss in one place may permit profits elsewhere. Individual farmers can sometimes do business profitably at prices that ruin their neighbors. When prices fall, it is advisable for most farmers to reduce their output. But it never happens that they should all reduce their production to the same degree. Reductions should be adjusted to the necessities of individual farms, so that the higher-cost acres and animals will be withdrawn first. Blanket reductions, applying equally to all farms and all farmers, are not desirable because such reductions press equally on the efficient and on the inefficient farmers, and equally on good and poor land. This goes against the first law of efficiency.

Under the plan of voluntary adjustment, many individuals must agree on a common course before anything can be accomplished. Moreover, the equal participation of all areas and all individuals can not be assured, nor can an equal distribution of the resulting benefits. These are undeniable difficulties. Yet I think they are less serious than the difficulties that would arise from a compulsory control of production. Such a system would fail completely to allow for the different necessities of different farms and different regions. It would certainly be opposed. It would also be inflexible. Lawmaking could not keep pace with market developments at home and abroad. Eventually the control laws would be ignored. In so far as they were observed they would tend, far more than any plan of voluntary adjustments, to throw our crop system out of balance, because quick crop shifts would be largely ruled out. Arbitrary reductions in the acreage of one or two crops would divert excessive effort to other crops. Surplus difficulties would spring up in new places, under conditions tending to perpetuate them. With their initiative fettered, farmers would find remedial action difficult. Moreover, the proposals so far made for the legislative control of acreage are State or regional proposals, whereas our problems of agricultural production are essentially national. Regional action can do nothing not likely to be offset by opposite action in other areas.

### Individual Readjustments

Many difficulties confront farmers who wish to promote regional crop readjustments. When an individual farmer has no assurance that the other farmers will join in reducing the acreage of a crop, he must try to establish the combination of crops and livestock that promises the most return on his own farm. When prices are very low, readjustments by shifting from one combination of cash enterprises to another do not produce significant increases in the farm income. Such readjustments, however, are not without importance, though they do not fully meet the emergency. Readjustments on individual farms may bring results (1) by increasing the noncash income of the farm family in food and feed crops and meat and other livestock products for use on the farm, and (2) by curtailing cash outlays. Extension workers emphasize the "live-at-home" type of farming. This is much to the point now. Through these two methods—pro-

duction of more commodities for direct use on the farm and modification of farm practice to save cash outlay—reduction takes place in the commercial output of farm products through the actions of the individual farmers. These adjustments are, at best, a painful process, which emphasizes the urgent necessity of avoiding or at least minimizing the price slumps in agriculture by voluntary adjustment through concerted action.

### Efficient Methods Reducing Costs

Mechanization continues to reduce costs of production in agriculture. With modern equipment one man can now handle 160 or more acres in the Corn Belt, as compared with an average of about 80 acres only a few years ago. Two-row and four-row cultivators handle nearly two and four times as much corn as the old one-row cultivator handled. Two-row mechanical corn pickers, with two men to run them, do as much work as six hand pickers. Duck-foot cultivators and row weeders almost eliminate the necessity for plowing in the summer fallow wheat areas of the West, and increase materially the summer fallow handled by one man. In the Great Plains a 16-foot combine harvests and threshes 35 to 40 acres of wheat a day. One such harvester can handle 500 acres of grain in 15 days. In 1928 the cost of harvesting an acre in Kansas by the combine was about \$2.20, as compared with \$3.50 for harvesting with a header and thresher, and \$4.40 for harvesting with the binder and thresher. Nearly 66,000 combines were sold in the United States in the period 1927–1930. In Kansas the number of combines increased from 2,796 in 1923 to 16,631 in 1929. Combines are now used in every State in which small grains are of any importance. In the Mississippi Delta, with modern power machinery, only 30 to 35 hours of man labor are required to grow an acre of cotton ready to pick, as compared with 80 hours under the old 1 or 2 mule system. In haying, one man, with a tractor-drawn mower and a side-delivery rake, covers 25 acres a day, or fifty times the area one man could cut and rake a century ago. If the windrow needs turning, it can be done with the tractor and the side-delivery rake. Production costs are reduced also by the use of better seed and more fertilizer, and by the more scientific handling and feeding of livestock. In the Southeastern States yields of both corn and cotton have been greatly increased through the use of winter legumes.

### Long Life Probable for Family Farm

In certain areas mechanization has greatly increased the size of farms and the investment per farm. It has been suggested that this development may foreshadow an increase in corporation farming as distinguished from family farming. Mechanization, however, does not necessarily involve corporation farming or absentee ownership. It is quite consistent with the family-sized farm, though it may make that farm larger. Much interest has been manifested since 1920 in large-scale farming, corporation farming, "chain" farming, and the like. A few conspicuous developments have taken place. But the movement toward the consolidation of holdings and toward farm operations on a large scale has not gone far. For the present, the subject is interesting mainly in its potentialities.

Large-scale farming as yet is a very minor thing in American agriculture. The capital value of all corporation farms that made income tax returns in 1924 was only 2.7 per cent of the total capital value of all the farms of the Nation. Some increase has taken place since 1924 in corporation farming, but the developments have not been spectacular. More remarkable is the change that has taken place since the war in the size of the family-farm unit, particularly in the Great Plains and in the newer cotton areas. The same tendency, though less pronounced, is evidenced in parts of the western Corn Belt. By enabling the family labor supply to cover more land, power machinery tends to conserve rather than to destroy the family-farm system. Long life is probable for the family-sized farm because the nature of farming does not admit of the standardization necessary to the economical employment of large labor forces. Farms have increased in size in the United States in recent years without any corresponding increase in the amount of human labor employed per farm, but rather with a tendency in the opposite direction.

### CROPS OF THE YEAR

Fall rains ended drought in most of the States that were drought stricken in 1930. But the winter was remarkably dry. Precipitation was less than half the normal over a large central northern area between the Lake region and the Rocky Mountains. Snowfall in the western mountains was so deficient that the supply of irrigation water was much reduced. On many western mountains the stored snowfall at the end of the winter was the smallest in 20 years. Rainfall in the spring months was generally sufficient, except in the Dakotas and Montana and in some districts further west. Only about half the normal rain fell in the Dakotas and Montana during the three spring months. Some parts of the more western States fared little better. This was North Dakota's third and Montana's fourth successive year of subnormal moisture. Minnesota had a deficiency also. In fact, the moisture supply in that State has been somewhat deficient every year since 1919. Good spring rains fell, and favorable temperatures prevailed in the Eastern States from New England to the Gulf of Mexico. The central valleys, though somewhat drier than usual, had enough moisture for satisfactory crop growth. In parts of the South, particularly in the Southeast, the weather was too dry in June, and the moisture supply continued short in the Northwest and Western States. Elsewhere June weather was favorable, and crops made good growth. July brought general relief to many southern localities that had previously been short of moisture, and also favorable rains over a wide belt from the middle Mississippi Valley eastward to the Atlantic Ocean where the 1930 drought was most severe. In this area the contrast between July rainfall in 1931 and July rainfall in 1930 was striking. In some States it was several times greater this year than last. Weather conditions were unusually favorable for maturing and harvesting the winter-wheat crop. In the spring-wheat States, however, heat and continued drought took heavy toll of wheat and severely damaged cultivated crops and pastures. Rainfall was insufficient for pastures over large areas of the interior valleys and in the Northwest, and also in the western grazing sections. Hay production was reduced. In the Southern States, on the other hand, moisture and temperature conditions continued favorable.

### Principal Crops

The United States this year produced large crops of cotton, tobacco, and winter wheat, and short crops of hay, spring wheat, and flaxseed. There were no pronounced deficits or surpluses of the other staple crops. Apples and peaches were produced in abundance. Crops with large acreages in the West suffered greatly. Ample winter and early spring rains, followed by a dry growing season, were ideal for winter wheat, cotton, and tobacco. In the area that was drought stricken in 1930, only Montana, Wyoming, and western North Dakota suffered again this year. The Ohio-Mississippi River area had abundant rain.

### Acreage

Abandonment of fall and winter sown crops was small, and the spring was favorable for planting and seeding. On July 1 the area available for harvesting totaled 360,784,000 acres, 0.2 per cent less than the harvested acreage of 1930. Hundreds of thousands of acres were subsequently abandoned in the drought areas of the Western States. Abandonment of cotton acreage, however, was much below the average. In consequence, the total acreage of crops harvested was only slightly less than in 1930. Corn planting increased 4.1 per cent; oats, 2.8 per cent; tame hay, 0.9 per cent; potatoes, 10.7 per cent; and sweet-potatoes, 20.6 per cent. Cotton planting decreased 10 per cent; barley, 1 per cent; flax, 15.2 per cent; tobacco, 1 per cent; and wheat, 4.7 per cent. The shift from cotton and wheat to feed crops was logical in view of the prevailing low prices for wheat and cotton and the short production of feed crops in 1930. Expansion in the acreages of vegetable crops for shipment and for canning was checked. Truck crops for table decreased 1 per cent and those for canning 18 per cent.

### Cereal and Other Food Crops

A very large crop of 775,000,000 bushels of winter wheat overshadowed a near-failure crop of only 109,000,000 bushels of spring wheat, so that the total wheat crop (884,000,000 bushels) was 7.5 per cent above the average of 1925-1929. The winter-wheat crop was 42 per cent greater than the average, while the spring-wheat crop was only 40 per cent of the average. Of the spring wheats, the durum-wheat production of 20,000,000 bushels was less than one-third of an average crop. Spring bread wheats were less than 43 per cent of the average production. Rye, while grown principally in the 1930 drought area, was harvested early and produced 36,200,000 bushels, as compared with an average production of 46,100,000 bushels.

Rice production was 41,700,000 bushels—800,000 bushels greater than the 1925-1929 average. The buckwheat crop of 10,600,000 bushels was much above the last year's short crop of 7,900,000 bushels, but 21 per cent below the 5-year average. A crop of 20,000,000 bushels of dry beans was less than last year's large crop but still above the 18,400,000-bushel average. Cowpeas, an important food crop in the Southern States, were in abundant supply. Peanut production was 929,000,000 pounds, as against an average of 796,000,000 pounds. Sorghum for sirup yielded 24,400,000 gallons, nearly double the 1930 production and 85 per cent of the average. Sugarcane acreage was increased, but the yield per acre was low, and the production of 19,100,000 gallons of sirup was 10 per cent less than average. The sugar-beet crop was about average.

### Cotton

The cotton crop was estimated on October 1 at 16,284,000 bales. At this figure it is the second largest ever produced. The largest was grown in 1926, when 17,977,000 bales were ginned. There was a production of 16,135,000 bales in 1914. This year's crop is 6.7 per cent above the 1925-1929 average of 15,268,000 bales. Acreage planted to cotton was 10 per cent less than in 1930, but abandonment was light, and the acreage left for harvest was 40,889,000—greater than the acreage harvested in any year prior to 1924, but 9 per cent below the 5-year average. Almost ideal weather conditions in all parts of the South, and below-average weevil infestation, more than offset the reductions in fertilizer applications. The yield per acre was 190.5 pounds, the greatest since the record yield of 209.2 pounds per acre in 1914. Yields per acre were well above average in every cotton producing State.

### The Feed Crops

The combined production of the major feed grain crops—corn, oats, barley, and grain sorghums—was 103,000,000 tons. This was a production 14 per cent greater than in 1930, but 5 per cent below the annual average in the 5-year period 1925-1929.

The corn crop was estimated at 2,703,000,000 bushels, which is practically equal to the 5-year average production. The crop was short from Michigan, Iowa, Nebraska, Kansas, and Oklahoma west to the Pacific, the shortage varying from 3 per cent in Oklahoma to 70 per cent in South Dakota. In the remainder of the country it was generally above the average.

Oat production was 1,174,000,000 bushels, 14 per cent less than in 1930 and 11 per cent below the 5-year average. Dry, hot weather at ripening in July accounted for the reduced yield. Exceptionally low yields were recorded in the Dakotas, Montana, and Wyoming, with low yields in a group of neighboring States from Wisconsin to Nebraska and west. On the other hand, heavy yields were harvested from Missouri and Kansas south to the Gulf.

A large proportion of the country's barley crop is grown in the States that suffered from drought. The yield per acre was only 16.9 bushels, as compared with 5-year average yields of 25.9 bushels. Only 216,000,000 bushels (82 per cent of the 1925-1929 average production) was produced on an acreage 25 per cent above the 5-year average.

Grain-sorghum production in the Southwestern States was estimated at 129,100,000 bushels, half again as large as in 1930 and 3 per cent above the 5-year average.

The hay crop was short. Production was 88,400,000 tons, as compared with 89,600,000 tons in 1930 and a 5-year average production of 107,500,000 tons. The wild-hay crop was cut to two-thirds of the average, and the alfalfa crop was much below the average. There was extensive killing of the new seedlings of clover and other grasses in the 1930 drought area. The effect on the 1931 crop was counteracted as to quantity by the use of emergency hay crops. The coarse nature of some of these emergency hays and a heavy admixture of weeds in clover and timothy meadows, lowered the quality of the crop materially.

The supply of feed grains is supplemented by cottonseed and linseed meal and wheat by-products, and in exceptional years, like 1930, by the feeding of wheat. This year production of cottonseed meal will be large. Of linseed meal, however, the production will be small. The supply of bran and middlings should be well up to the average. Products supplemental to the hay crop will be in smaller supply. Corn, grain sorghums, and sorgo (sweet sorghum) forage will be somewhat more plentiful. The carry-over of old hay, which was large a year ago, was very small this year, and grain pastures are neither so plentiful nor so productive as they were last year.

### Tobacco and Flax

A new record in tobacco production appears to have been set. The crop was estimated in October at 1,661,000,000 pounds. This is slightly larger than the 1930 crop, the largest previously, and 22 per cent above the average production during the previous five years. The season was favorable, and a slight decrease from the 1930 acreage was more than offset by increased yields. Burley-tobacco production (468,000,000 pounds) was more than 70 per cent above the 5-year average. The production of flue-cured tobacco, at 694,000,000 pounds, was much below the production last year, but slightly above the 5-year average. Fire-cured tobacco, 207,000,000 pounds, was 26 per cent above the average. Final yield and production figures will depend upon shrinkage in curing. The curing season in 1931 was generally favorable.

The flax crop was grown in the 1931 drought area. It totaled only 11,500,000 bushels—barely half a crop. Average production is 20,900,000 bushels. The quantity, including imported seed, used in crushing in the United States has averaged about 39,000,000 bushels in recent years. The yield on planted acreage in North Dakota was only 2.7 bushels, and for the United States only 3.7 bushels.

### Fruits and Vegetables

Fruit production was ample. Of the five principal fruits, apples and peaches were each more than one-fourth above the 5-year average; pears were one-tenth above it; orange production was about the average; and only grapes were below the average. The production of these five fruits combined was about 10 per cent greater than the 5-year average and about 17 per cent above the production in 1930. The apple crop was reported at 223,000,000 bushels, with a commercial crop of 37,600,000 barrels. In the two principal apple-producing States, Washington and New York, the crops were about equal to the average of recent years. In the central area from Pennsylvania, Maryland, Virginia, and North Carolina west to Michigan, Illinois, Missouri, and Arkansas, the crop was from 50 to 150 per cent above the average. The production of peaches was about 78,000,000 bushels, a new record. Home canning was stimulated by low prices, but large quantities of peaches were allowed to go to waste for lack of a market.

The pear crop of 24,000,000 bushels was 13 per cent less than the record 1930 crop, though 9 per cent above the 5-year average. Just as in the case of apples, it was the central group of fruit States, rather than New York and the Pacific Coast States, in which production was held above the average.

The grape crop in California was greatly reduced by drought, heat, and insect damage. It was only 1,300,000 tons, as compared with an average production of 2,200,000 tons. New York, Pennsylvania, Ohio, and Michigan—the leading grape States of the East—had crops ranging from 8 to 50 per cent above the average. Total grape production was about three-fourths of the 5-year average.

The crop of prunes in the Pacific Coast States was much below the 1930 crop, but just about equal to the 5-year average consumption of both fresh and dried prunes. The crops of oranges and grapefruit in Florida are estimated at about one-fifth less than the large crop of 1930. California citrus production will probably be about the average. A large crop of cranberries was harvested.

The production of potatoes amounted to 375,000,000 bushels, about 9 per cent greater than in 1930, but about 2 per cent less than the average crop. The yield per acre was 106.9 bushels—3.3 per cent below the 10-year average. The area planted was 3,506,000 acres, or 4 per cent greater than the average acreage from 1925 to 1929.

The crop of commercial early potatoes was about 46,000,000 bushels, greater by 3,000,000 bushels than in 1930 and 7,000,000 bushels above the 5-year average. In 19 surplus late-potato States, the production of 255,000,000 bushels was 9 per cent greater than in 1930; in 16 deficit States, production was 3 per cent more than last year.

The sweetpotato crop was hurt by dry weather in September, but the acreage was much greater than in 1930, and the production was 77,000,000 bushels, or 15,000,000 bushels greater than in 1930 and only 3,000,000 bushels less than the 5-year average. The production of cabbage, onions, and tomatoes for canning was considerably below that of 1930.

### WHEAT SITUATION

This has been a disastrous year for wheat growers, but the first seeds of the trouble were planted many years ago. They were wheat seeds and led to world-wide overproduction. When the war deprived Russia of its customary wheat market in western Europe and also curtailed all European wheat production, the wheat industry was enormously stimulated in the United States, Canada, Argentina, and Australia. As already noted our own wheat area decreased after the war but rose again to 61,464,000 acres in 1929, and was only about 6 per cent below that figure this year. In Canada, Argentina, and Australia, after a spurt during the war period and a temporary decline afterwards, wheat acreage climbed similarly. The aggregate increase for these three countries between 1924 and 1929 was no less than 10,000,000 acres. Russia began expanding its wheat acreage in 1923 and reentered the world's wheat market in 1930 with a wheat production equal to or greater than its pre-war production. The wheat area in Russia harvested in 1931 was officially reported to be 92,400,000 acres, an increase of 8,600,000 acres over the 1930 wheat acreage. Including the estimated production of Russia but not that of China, the world's wheat output in 1930 was nearly 4,900,000,000 bushels, as compared with a pre-war record of about 4,100,000,000 bushels in 1913.

Seldom has a more extreme example of overproduction existed in modern agriculture. It is a cumulative, and not merely a seasonal, condition. This is shown by the mounting world carry-overs, which demonstrate that more wheat is produced annually than is consumed

annually. On July 1, 1931, the world carry-over of wheat was estimated at 679,000,000 bushels, as compared with 578,000,000 bushels on July 1, 1930. These figures include, for the United States, an item not formerly included, namely, an estimate of wheat stored by mills for other interests. Leaving out this item, and estimating the carry-over on the old basis, the world's carry-over on July 1, 1931, was 659,000,000 bushels, as against 569,000,000 bushels on July 1, 1930.

World production of wheat this year will be less than last year's, but the difference will not make a large cut in the carry-over into next year. As now estimated, world wheat production for 1931 is reckoned at from 200,000,000 to 300,000,000 bushels less than the output in 1930. This country's crop shows an increase (884,280,000 bushels, estimated on October 1, as against 863,430,000 bushels harvested in 1930); but the production is lower in Canada, Russia, Argentina, Australia, and parts of Europe. The Northern Hemisphere (outside Russia and China) has an indicated output of 3,250,000,000 bushels, as against a harvested production of 3,314,000,000 bushels in the same area last year. Relative to the reduced demand by importing countries, the world's wheat surpluses this year have thus far been more burdensome than they were last year.

### World Consumption of Wheat

Many farm commodities are low in price just now because demand has fallen. The demand for wheat has fallen too, because importing countries lack the purchasing power to maintain their imports at the usual level. But wheat consumption has not declined as much as the consumption of some other farm commodities. In hard times poor people eat relatively more cereals, and cut down on other things. World consumption of wheat has grown steadily in the last 10 years. In the 1930-31 season, total apparent disappearance of wheat outside Russia and China (for China consumption statistics are not available) was 3,800,000,000 bushels, as compared with only 3,200,000,000 bushels in 1921-22, and also in 1922-23. The consumption in 1930-31, a depression year, was well above that of the preceding year, and about equal to that of the highly prosperous season 1928-29.

The main trouble with wheat has not been a declining consumption but a too rapidly mounting production. This conclusion is not set aside by the fact that the world's wheat output this year will be somewhat less than it was in 1930-31. It is the trend that counts. Wheat growers are suffering from the maladjustments of two decades. The burden falls heaviest on the wheat-exporting countries. Wheat-deficit countries can protect their wheat growers by tariffs, embargoes, and milling restrictions.

In the years of industrial expansion and thriving trade that preceded 1930, the weakness of the world's wheat industry was masked. Prices were high enough to keep poor land in production, and to make good land profitable. In the seven years ended July 1, 1930, No. 2 hard wheat at Kansas City averaged \$1.28 a bushel. Despite warnings, farmers thought they were safe in expanding their production. They attached insufficient importance to world-wide increases in wheat acreage and in wheat carry-overs, and to the import-restriction policies that betokened distress in wheat-deficit countries. Economic depression brought the underlying trouble to a head. The combina-

tion of world overproduction and business depression resulted in extremely low prices. For the United States as a whole, the farm price of wheat as of October 15, 1931, was only 36.1 cents a bushel, as compared with 65.6 cents on October 15, 1930. There was some recovery in October and early in November. In the pre-war period 1910-1914, the average farm price of wheat was 88.4 cents. Farm expenses of production and living costs are much higher than they were before the war. Debt and taxes are much greater. Hence prevailing wheat prices are literally ruinous.

### United States Farmers Aided by Farm Board

Our own wheat farmers suffered less than those of the other principal wheat-exporting countries in the wheat-price slump, because from the middle of November, 1930, to the middle of June, 1931, the Federal Farm Board maintained prices in the United States at a level well above the world market. No Government agency, however, can support wheat prices indefinitely against pressure of the sort that has come against them in the last two years. Surplus production and lack of purchasing power in the principal importing countries make an insuperable obstacle. Therefore it is encouraging to note that various countries are beginning to reduce their wheat acreage. The wheat acreage was reduced this year in the United States, Canada, Argentina, and Australia. Though the reductions were brought about partly by adverse weather conditions at seeding time, the price situation was not without influence. Russia shows no disposition to join the movement. Wheat growing in Russia, moreover, is carried on in such a way that plantings do not respond to world prices as do plantings in other countries. This is a factor with which wheat growers in all other countries must deal. It means that their readjustment problem will be more difficult than it would be if Russia could be counted on to behave as other countries do when markets fall. But no country can continue to produce for export indefinitely at a loss. Russia, too, must eventually count all its costs of production. It is not probable they are less than those of the more favorably situated wheat-producing areas elsewhere. In the United States it seems desirable further to reduce the acreage in wheat in all areas where costs of production are relatively high. When surplus stocks have been absorbed and excess acreage withdrawn from production, and when various elements in production costs and handling costs have been adjusted to the prevailing lower price level, our wheat industry should again be prosperous though reduced in size.

### COTTON SITUATION

Cotton prices fell at the beginning of the 1931-32 season to the lowest point touched since 1898, with no proportionate decline in the farmers' costs of production. As a result, the situation of the cotton growers became as serious as it had ever been in the history of the country. The difficulty sprang from circumstances long in preparation, as well as from the prevailing world depression. About 10,000,000 acres were added to the cotton area of the United States after the war, and methods were developed for combating the boll weevil. The increased acreage, combined with increased yields per acre, enabled the United States to produce large cotton crops under average

conditions. In exceptionally favorable seasons, it produced cotton excessively.

Meantime foreign countries, responding to the stimulus of the previous cotton shortage, expanded their production. India, Egypt, and Russia enlarged their output greatly, and other countries began growing cotton. Foreign cotton spinners encouraged these developments, which coincided for some years with large world consumption. Hence the cotton market did not feel any depressing effect immediately. But the inevitable reaction was merely postponed. Despite an increased industrial demand for cotton in the United States, more than half the American crop had to be sold abroad. It came into competition with cheaper foreign cottons, which foreign spinners purchased in an increased proportion to their total requirements. When importing countries reduced their takings on account of disturbances in the market for cotton goods, it became apparent that cotton growing was over-expanded. Great Britain, the largest foreign consumer of American cotton, lost trade in cotton manufactures owing to the development of cotton-textile manufacturing in other countries, and also as a result of the Indian boycott on foreign goods. Some of the countries that expanded their cotton-textile manufacturing specialized in the cheaper foreign cottons, to the obvious injury of our cotton export trade.

#### Downturn Preceded Depression

These influences had noticeable effects nearly a year before the present world depression started. Cotton exports from the United States fell off in the latter part of the 1928-29 cotton marketing season. Germany's textile industry, which had been fairly active, became almost as depressed as Great Britain's, and textile manufacturers in other countries of central Europe found the going hard. It is thus evident that the slump in the world's trade in 1929 did not cause, but merely accentuated a disparity between the production and the consumption of cotton. World consumption of cotton at the rate attained in the postwar period of industrial activity could not last, because it was not backed up by sufficient buying power in the cotton-importing countries. Europe in particular could not export enough goods to pay for its imports, and the balance had to be struck in credit. When this could no longer be satisfactorily done, cotton consumption had to decline. Economic difficulties elsewhere made matters worse. China's demand for cotton was restricted by the fall in the purchasing power of silver. Russia, which for some years had imported American cotton, is using home-grown cotton almost altogether and during the past season had some left for export. Cotton consumption dropped everywhere as the depression gathered force, and cotton stocks accumulated.

Prices naturally declined. In order to check the movement the Federal Farm Board formed a Cotton Stabilization Corporation, which bought and stored about 1,300,000 bales of cotton. The Farm Board also loaned money on cotton to cotton cooperative associations. Nevertheless Middling  $\frac{3}{8}$ -inch cotton at the close of the 1930-31 season sold, at 10 principal markets, at an average price of less than 8 cents per pound. For the entire 1930-31 season the price at these markets averaged 9.61 cents per pound, as compared with 15.79 cents in the

1929-30 season and 19.72 cents in the 1927-28 season. Though the consumption of cotton in the United States increased as the 1930-31 season progressed, total domestic consumption for the season was only 5,271,000 bales, as against 6,106,000 bales in 1929-30 and 7,091,000 bales in 1928-29. Exports of cotton in the United States in the 1930-31 season were only 6,760,000 bales, as compared with 8,044,000 bales in the 1928-29 season. Foreign cotton consumption did not improve in the early months of the present season, which began with a world carry-over of American cotton that was the second largest on record. The supply for the 1931-32 season is well above the previous record supply of 1926-27 and more than twice as large as the world's consumption of American cotton in 1930-31.

### Farmers Were Forewarned

This disastrous situation did not fall upon the farmers without warning. In the fall of 1930 the Department of Agriculture issued a special outlook report for the Southern States in which developments affecting the cotton situation were considered in detail. The report drew attention to "certain long-time developments which may necessitate adjustments in production over a period of years." It urged the advisability of considering the problem before adjustments were forced upon the country. This recommendation, with various facts about cotton conditions at home and abroad, was carried to farmers through Federal, State, and private agencies. Acreage planted to cotton in 1931 was reduced, as were production costs. Though the acreage reduction did not suffice to strengthen the cotton market, or the reduced expenditures to make the crop profitable, it indicated a definite response to "outlook" information.

In adjusting the production of cotton to market requirements, there is no question of withdrawing from the foreign market. American growers can compete with foreign producers, and cotton is generally more profitable or less unprofitable than other crops that can be grown in the South. During the first rapid spread of the boll weevil, this country's power to retain its position in the world's cotton trade was questioned. It has since demonstrated its ability to hold its place in spite of the boll weevil, and in the face of increasing foreign competition. The immediate need is not further evidence that cotton can be grown abundantly in the United States, but more attention to means of reducing production costs and improving the quality of the crop, while at the same time its volume is adjusted more nearly in harmony with the world's demand. Land that can not grow cotton profitably under average conditions should be eliminated from cotton growing. Efforts should be continued to improve the staple and the spinning qualities of cotton. The department is conducting research on these and allied problems. Further study should be given to the problem of making premiums for superior cotton available to growers at country markets. Substantial progress in this direction has been made in recent years, through the work of public agencies and farmers' cooperative associations.

### LIVESTOCK SITUATION

Livestock producers at the beginning of 1931, like the producers of other agricultural commodities, were faced with the problem of marketing their products under adverse conditions. With domestic and

foreign demand greatly reduced, sharp price recessions were necessary to move the market supply of meat.

Supplies of livestock, other than sheep and lambs, marketed during the year were not excessive for normal conditions, but as a result of the reduced consumer demand, returns to producers for all classes of livestock were much smaller than those of 1930 and were probably the smallest for any year since 1911. The total live weight of livestock slaughtered under Federal inspection during the first half of the year, amounting to 10,333,000,000 pounds, was only about 2 per cent larger than the relatively small volume slaughtered during the corresponding period in 1930, but the total amount paid by slaughterers for such stock was 28 per cent less.

In other words, total expenditures by slaughterers for these animals dropped from \$1,006,000,000 during the first half of 1930 to \$723,000,000 during the first half of 1931. Of this reduction of \$283,000,000, about \$150,000,000 was on hogs, \$112,000,000 on cattle, \$12,000,000 on sheep and lambs, and \$9,000,000 on calves. Farm prices of livestock in August averaged 23 per cent lower than those of a year earlier, whereas grain prices were down about 47 per cent, cotton prices 44 per cent, prices of fruits and vegetables 35 per cent, and those of dairy products 26 per cent.

Cattle numbers on farms have had an upward trend since 1928 but 1931 was the first year since 1926 in which cattle and calf slaughter was larger than in the previous year. During the first half of 1931, 2.8 per cent more beef and 7.4 per cent more veal were produced under Federal inspection than in the corresponding period in 1930; steer slaughter, amounting to 2,151,000 head, increased by 155,000 head, or 8 per cent. Low prices caused the holding back of many cows that would normally have been marketed, and cow and heifer slaughter, totaling 1,625,000 head, fell off 100,000 head or 6 per cent. The ratio of steer slaughter to total slaughter was relatively higher in June than in any previous month of the year, indicating that reduction in dairy herds by slaughter was still relatively light. Midsummer reports from dairy men indicated that the supply of such cows going to market during the last half of 1931 would be considerably larger.

### Declines in Livestock Prices

From the first week in January to the last week in May the decline in the weekly average price of different grades of steers at Chicago amounted to \$5.50 per hundred pounds on choice, \$4 on good, \$2.40 on medium, and \$1.60 on common. An unusually high percentage of the better grades in the supply tended to accentuate the decline on these grades. The average price of slaughter cattle during the first six months of 1931 was \$6.61, as compared with \$9.74 and \$11.04, respectively, during the corresponding periods of 1930 and 1929. The average price of calves was \$7.88 during the first half of 1931, while it was \$10.85 and \$13.17 in the corresponding periods of 1930 and 1929.

Prices of the better grades of steers and heifers advanced materially between the first of June and the end of August, but prices for the lower grades of cattle were only slightly higher at the end of this period than at the beginning. The decline in stocker and feeder prices in June, when stocker and feeder shipments into the Corn Belt were the smallest for the month in at least 13 years, reflected a widespread lack

of confidence in future cattle prices, poor pastures in the Middle West, and poor range and feed prospects in some Western States. As a result, the estimated number of cattle on feed in the Corn Belt on August 1 was 13 per cent smaller than on that date in 1930. With two years of unprofitable cattle feeding to look back upon, Corn-Belt feeders reported a considerable decrease in the number of cattle they expected to purchase in the fall of 1931 despite the prospects of a large supply of cheap feed. It is probable, however, that the August advance in the prices of the better grades of fed cattle will result in a stronger feeder demand late in the season than was indicated by the August 1 report.

Nevertheless, the relative economic position of the cattle industry as compared with that of most of the alternative agricultural enterprises remained as favorable as when prices were on a much higher level. The farm price of beef cattle in July was 66 per cent of the 1925-1929 5-year July average. Corn, butter, and hog prices were 58 per cent, lamb prices 38 per cent, and wheat prices 35 per cent of their respective July averages for that period. In 1930 the per capita supply of beef and veal from total slaughter was the smallest in the 31 years for which records are available. The per capita supply for 1931 will not be materially larger.

### Hogs Bring Lower Returns

The number of hogs on farms has declined in recent years. The total of 52,323,000 on January 1, 1931, was about 8,300,000 less than on that date in 1928. Federally inspected slaughter was reduced from 49,795,000 head in 1928 to 44,266,000 head in 1930. Slaughter in the calendar year 1931 may not differ greatly from that in 1930, but the number slaughtered during the crop year ended September 30, 1931, showed a reduction of about 5 per cent. A reduction of 1 per cent in the number of hogs slaughtered under Federal inspection during the first half of 1931 was more than counterbalanced by an increase in the average weight. The total dressed weight of 4,100,000,000 pounds was 1.2 per cent larger than the relatively small production during the corresponding period in the year previous. The average price paid by slaughterers for these hogs was \$7.05 a hundred pounds, as compared with \$9.90 paid in the first half of 1930. This is a reduction of 29 per cent.

Hog prices declined steadily from October, 1930, to February, 1931. After a temporary seasonal rise in March, the decline was resumed in April and was not checked until early June, when new postwar lows were established despite the fact that slaughter supplies were the smallest for May in five years. There was a reduction of 1,273,000 head in Federal-inspected slaughter during May, June, and July. Yet the summer seasonal rise in hog prices was relatively small, and was completed by August 1. Prices declined sharply through that month and at the beginning of September were at the lowest level since 1908. Nevertheless the relationship of feed prices to hog prices continued favorable for hog feeding, and the 1931 spring pig crop was increased 2.5 per cent. A large increase in the fall crop was indicated.

Foreign demand for hog products was relatively weak. Hog producers in central Europe and Denmark have greatly expanded their pro-

duction in recent years. Although total exports of hog products in 1930 were smaller than in any previous year in the present century, a further reduction occurred in 1931. Exports of lard in the first half of the year were 18 per cent smaller and those of pork 47 per cent smaller than in the first half of 1930.

### Record Slaughtering of Sheep

Sheep on farms in the United States have increased in number every year for the last nine years. At the beginning of 1931 the country had the largest number of sheep and lambs on record. There were approximately 16,000,000 head more on January 1, 1931, than on January 1, 1922, the low point in the present production cycle. This was an increase of 44 per cent. During the last seven years the estimated annual lamb crop of the United States has increased about 1,500,000 head each year. The total of 31,684,000 head, estimated in 1931, was almost 10,000,000 head larger than the crop of 1925. Inspected slaughter increased about 53 per cent between 1922 and 1930, or from 10,929,000 head in the former year to 16,696,000 head in the latter. Because of population growth, however, the per capita supply of lamb and mutton increased only from 5 pounds to 6.6 pounds, or only 32 per cent. New high monthly record slaughtering under Federal inspection have been made in every month but two (November, 1930, and March, 1931) since January, 1930. Per capita consumption during 1931, however, will probably be somewhat smaller than the record of 8.1 pounds in 1912.

Despite increasing market supplies each year, sheep and lamb prices remained relatively high from 1922 to 1928 inclusive. In April, 1929, however, a sharp downward trend began, which was not checked until October, 1930. Prices were fairly stable during the last three months of 1930, and advanced moderately during the first three months of 1931. The trend has been downward since April. Farm prices of lambs in July were lower than in any other July since 1911. Farm prices of sheep in July were the lowest for any month since records of farm prices were started in 1910. Market prices for aged ewes were so low that returns would sometimes barely cover marketing costs. Large numbers of such ewes were held back, and lambs made up an unusually large proportion of the slaughter supply.

### Wool

The wool clip of the United States increased in 1931 to 368,000,000 pounds, or 7 per cent more than in 1930. Preliminary estimates indicate that the world clip for the year will be almost as large as the record clip of 3,210,000,000 pounds shorn in 1928. World stocks of wool are large. Wool consumption by woolen mills in the United States during the first half of 1931 was considerably larger than in the first half of 1930, but no significant increases in consumption have yet been reported by mills in European countries. A downward trend in wool prices started in 1928. It continued with few interruptions into 1931. Recently increased activity in the wool-textile industry of the United States has brought a strengthening of domestic wool prices.

## DAIRY SITUATION

The sharp declines in prices of dairy products which began late in 1929 continued well into 1931, and incomes from dairying were drastically cut. This situation obliged dairymen to consider their production programs carefully and to undertake desirable readjustments. From its nature, however, the dairy industry can be readjusted to changing market conditions only very slowly, and production is still high. For quick relief dairymen are doing what they can to reduce their costs and to develop supplementary sources of income. Meantime they are instituting long-time production adjustments by culling out low-producing animals, and by decreasing the proportion of heifers in their herds. Though this procedure may not have noticeable effects on dairy prices for some time, it is permanently constructive and will unquestionably have important beneficial results eventually.

The number of dairy cows in the United States has increased gradually since 1900. There were 2.4 per cent more milk cows on farms on January 1, 1931, than a year earlier. Moreover, the number of yearling heifers exceeded the number required for normal replacement. Nevertheless the prevailing low prices for dairy products may bring about substantial readjustments. As already noted, dairymen show a disposition to raise fewer dairy heifers. The ratio in 1931 of heifers 1 year and 2 years old to the number of dairy cows decreased. This decrease was a reflection to some extent of the unsatisfactory price situation. The number of dairy cows on farms will probably not increase as greatly in the near future as it has done in the recent past.

## Other Readjustment Possibilities

Other readjustment possibilities exist. Dairy production depends materially on the relation between feed prices and the prices of dairy products. Just now feed prices are low as well as the prices of dairy products. Hence, the relationship is still not unfavorable to dairy production. Improvement in grain prices, however, would soon make it less favorable. Another possibility of change lies in the fact that dairying is very closely associated with beef-cattle production in certain parts of the country. Indeed a large part of our total dairy output comes from areas that draw no sharp line between dairy cattle and beef cattle. When the beef-cattle industry is depressed, dairy output in these areas increases. With improvement in the beef situation, a shift in the opposite direction takes place. Slaughter of dairy cows and heifers was relatively low in the first half of 1931. Recently it has increased. Reduction of dairy herds by slaughter should strengthen the dairy industry materially. As other branches of agriculture come into a better relationship to their markets, pressure upon dairying will be relieved. Such pressure is heavy in periods of depression because dairying more than any other farm enterprise is resorted to as a source of cash income to meet current expenses.

Until the onset of the depression in 1929, the demand for dairy products in the United States had risen quite steadily for a number of years. Since then it has fallen off. Consumption of fluid milk has dropped, and consumption of manufactured dairy products has not increased appreciably despite heavy price declines. The dairy surplus has gone mostly into butter, and the butter markets have carried much

of the burden. Butter production in 1930 was not excessive because of the drought. In fact it barely equaled the production of 1929. In the early part of 1931 butter production was unusually heavy. It declined somewhat during the summer months, during which period drought again prevailed in some important butter-producing areas. Total production of all manufactured dairy products this year has been somewhat less than it was in 1930. Hence, the underlying supply and demand situation suggests improvement.

Reserve stocks of dairy products have been reduced greatly. Cold-storage supplies of butter and American cheese on September 1 were the lowest for that date since 1923, and stocks of condensed and evaporated milk held by manufacturers were the lowest for that date in the last three years. This decline in current supplies tends obviously to support the dairy markets, but in the conditions now prevailing it is not doing so to the degree that it would in better years. One cause is an extremely conservative buying policy among the distributors of dairy products, who do not know how consumption might be affected by price advances. Improved business conditions would undoubtedly cause an increase in the consumer demand for dairy products; but in the present condition of the dairy industry such an increase could easily be offset by an increase in dairy production. Improvement depends largely on the restoration of better demand conditions. Production power is so elastic, however, that much depends on action taken by the dairy industry. With the number of dairy cows increasing, it is comparatively easy to expand dairy production. Restraint is necessary if the dairy industry is to improve when business and agriculture generally improve.

### POULTRY SITUATION

Poultry men faced unusually perplexing problems. Poultry production gave relatively better returns than egg production. Excessive stocks of eggs were stored in 1930, and egg prices remained low during the storage season. Storage operators lost heavily. In consequence, they followed this year a cautious policy which tended to keep egg prices down. Prices to producers for eggs during the first eight months of 1931 averaged below those for any similar period since 1910. Curtailed hatchery operations reduced the size of the new poultry crop by fully 8 per cent, and there was close culling in farm flocks. The number of laying hens in farm flocks was reduced below the number last year and below the 5-year average for the period 1925-1929. On the other hand, liberal feeding of grain and poultry feed caused relatively high egg production per hen. Total production of eggs during the summer and early fall was heavier than had been expected, and storage stocks of eggs increased. Total stocks of both shell and frozen eggs on September 1 exceeded the 5-year average. Meantime lessened consumer buying power tended to check consumption. As a result the usual fall seasonal rise in egg prices was below normal.

Prices to producers for chickens averaged lower this year than in any year since the war. Feed costs were low, however, and the returns to producers were generally more satisfactory than in other lines. As the year advanced the spread widened between the cost of poultry rations and the market prices of poultry and eggs. Close culling of flocks, smaller farm consumption of poultry, and liberal feeding furnished the markets with a steady supply of poultry, which was exceptionally well

finished. Consumption of poultry was remarkably well maintained, and storage stocks until early fall were relatively light. Poultry prices were profitable to storage operators during the first half of the year. Heavy marketing of poultry developed in July, however, and the market situation became less favorable.

### FRUIT AND VEGETABLE SITUATION

Prices of fruits and vegetables this year, with few exceptions, declined to levels much below those prevailing in 1930. Late lettuce was an outstanding exception. Pears, owing to light production, resisted the downward trend fairly well. Potatoes and peaches were extremely cheap. Peach production was a record. Apple production was large, and apple prices correspondingly low. The August forecast indicated the heaviest crop since 1926. Output of cantaloupes and similar melons in eight late-producing States was about 6 per cent more than in the previous season. Grape production, on the other hand, was reduced by hot weather, and was estimated at 28 per cent below the production of 1930. In 10 late-shipping States the output was estimated at about 12 per cent below the production in 1930. Drought conditions in Florida ended in July, and the prospects for oranges and grapefruit in that State improved. In California, though high temperatures prevailed, the fruit was sufficiently advanced in September to prevent shedding or serious injury. Output of watermelons in 16 late States was estimated at 36 per cent more than in 1930. Potato production was substantially larger than in 1930, particularly in the Northeastern States. Sweetpotato production was estimated in August at about 30 per cent above the output of the previous year. Production of onions in 17 States was about 31 per cent less than in 1930. Tomato production in 14 late-producing States was nearly 20 per cent greater than in 1930. Excessive production in many lines and low prices brought about an unusual number of bankruptcies in the fruit and vegetable trade, and net returns to growers were small.

Growers had the advantage of some decrease in fertilizer prices and in wages. On the other hand, diminished demand lowered prices for some of the less desirable sizes of fruits and vegetables to a point below harvesting and transportation costs. Shipments of No. 2 potatoes from the South Atlantic States were relatively small, and the prices received even for No. 1 potatoes were unprofitable to most growers. In the Imperial Valley of California cantaloupe production was enormous, and the quality of the crop was fully up to the average; yet cantaloupe prices were so low that the year was considered the most disastrous in the history of California's cantaloupe industry.

### Heavy Losses to Growers

It proved impossible, from the beginning of the season, to realize the costs of packing and marketing small-sized plums on the Pacific coast. The same was true of peaches in Georgia. In both these areas considerable quantities of fruit were not moved. Marketing outlets for canned goods were restricted. Cannery and dealers began the season with unusually large carry-overs, particularly of peaches. Accordingly, California cannery limited their pack for the current year. This involved heavy loss to the growers. Overproduction of yellow

cling peaches for canning had become chronic in California. Cannery and growers' organizations cooperated this year in a new method of adjusting production to demand whereby marginal orchards were destroyed under an arrangement involving payment at a relatively low rate per ton for fruit on the trees provided the trees were uprooted before the crop was ready for harvesting.

This outstanding example of economic readjustment to market conditions followed recommendations offered four years ago by Federal and State officials. The overplanting of cling peaches was emphasized by the so-called peach war of 1927, in the course of which the entire crop of Tuskenas (Tuscans) was permitted to go to waste while growers and cannery argued over prices. When Federal and State officials recommended the systematic removal of enough acreage to bring production into line with the demand, with the operation financed by contributions from the entire industry, the proposal met with much criticism. To-day it is in process of accomplishment. It should enable growers to avoid the usual process of adjustment through bankruptcy and permit the preservation of the better orchards. Similar plans to solve the surplus problem of the grape industry have been under discussion. A remedy is needed urgently because the demand for juice grapes has decreased in the Eastern States and the production of table and raisin grapes has continued to increase. So serious have been the resulting difficulties of the grape industry that many owners have lost their vineyards.

## EXPORTS AND IMPORTS

The value of our agricultural exports in the fiscal year ended June 30, 1931, amounted to only \$1,038,000,000. This was a reduction of \$457,867,000 from the total of the preceding fiscal year, and was the lowest for any year since 1911. In volume our agricultural exports have declined about 25 per cent in the last two years. Most of this decline took place in the 1928-29 season, but meat products suffered most in the 1930-31 season. Exports of fruit products were greatly reduced in the 1929-30 season, but recovered in the 1930-31 season. Exports of tobacco have been well maintained through the depression.

The percentage of agricultural production exported declined between 1928-29 and 1929-30 from 12.2 to 10.2 per cent, and probably declined more in 1930-31. In 1919-20 the United States exported about 17.4 per cent of its agricultural production. The depression in 1921 brought the proportion down to 13.5 per cent. There was some recovery; and in 1924-25 the ratio was 16.1 per cent. Since then the trend has been downward.

Cotton has suffered most from the reduction in foreign demand. Exports of cotton excluding linters declined from 8,520,000 bales in the 1928-29 season to 7,096,000 bales in the 1929-30, season and 7,048,000 in the 1930-31 season. The reduction in volume was accompanied by a much greater reduction in value. In the 1930-31 season the value of our cotton exports was only 56 per cent of their value in the 1928-29 season.

Exports of wheat, including flour in terms of wheat, declined from 163,687,000 bushels in the 1928-29 season to 153,245,000 bushels in 1929-30 and 131,536,000 bushels in 1930-31. The volume of our wheat exports in the 1930-31 season was 14 per cent less than in the

previous season, and the value 38 per cent less. A short corn crop in 1930, as well as unfavorable foreign conditions, resulted in a great reduction also in the exports of feed grains.

Exports of meat and meat products have been greatly reduced. Exports of total meats decreased 35 per cent in the 1930-31 season, as compared with the previous season. The main decline was in pork products. Bacon and Cumberland sides fell off 61 per cent, from 132,967,000 pounds in 1929-30 to 52,412,000 pounds in 1930-31; hams and shoulders dropped 23 per cent, from 130,318,000 to 99,749,000 pounds; fresh pork decreased from 18,768,000 to 11,093,000 pounds, or 41 per cent; pickled pork was reduced by 47 per cent, from 39,809,000 to 21,118,000 pounds. Fresh pork exports were the lowest since 1914-15; exports of pickled pork had not been so small since 1851. The lowest intervening year was 1869, when the amount was 24,000,000 pounds. Exports of bacon were the lowest since 1870, in which year they were 39,000,000 pounds. Export of hams and shoulders were the lowest since 1894, except in 1910-11, when they were 58,000,000 pounds.

Exports of leaf tobacco declined only slightly from 587,125,000 pounds in 1929-30 to 566,036,000 pounds in 1930-31. The decrease was general in all classes except Maryland and Ohio Export, which increased 29 per cent.

#### Increased Exports of Fresh and Dried Fruits

Considerable increases were recorded in the exports of fresh and dried fruits. Exports of dried apples were 38,121,000 pounds, as against 23,769,000 pounds in the fiscal year 1929-30. Export movement of dried prunes jumped to 296,254,000 pounds from 142,989,000 pounds the previous year. Exports of dried fruits for salads totaled 14,518,000 pounds, as against 1,332,000 pounds the previous year. Exports of fresh apples were 6,780,000 barrels, as compared with 3,426,000 barrels in 1929-30. Exports of fresh pears rose to 134,670,000 pounds, after a decline to 62,024,000 pounds in 1929-30. Exports of oranges and lemons were about the same as in the previous year; and there was an increase of 43 per cent in the quantity of grapefruit exported.

Exports of canned vegetables declined 33 per cent in both quantity and value. Exports of vegetable oils decreased in both quantity and value. Cottonseed-oil exports (crude and refined) fell from 31,998,000 to 26,353,000 pounds, with a decrease of 20 per cent in value; linseed-oil exports dropped from 2,129,000 to 1,298,000 pounds, with a 51 per cent decrease in value; soybean-oil exports were 4,410,000 pounds in 1930-31, as against 5,509,000 pounds in 1929-30.

Imports of agricultural products (excluding forest products and rubber) were reduced in volume and value. For the season July 1, 1930, to June 30, 1931, they amounted to \$1,067,000,000, a decrease of 37 per cent from the total of the preceding year. The value was the lowest since 1914-15. Imports of animal products were greatly reduced in both volume and value. The value of imported dairy products was reduced 47 per cent; of imported eggs, 67 per cent; of imported hides and skins, 53 per cent; of imported meat and meat products, 71 per cent; of imported silk, 37 per cent; and of imported wool, 59 per cent.

The quantity of coffee imported increased, but the value decreased. Imports of sugar and tea declined slightly in value. A great reduction

in the value of sugar had taken place before the present depression began. Imports of vegetable oil and oilseed products decreased in value. The volume of the imports of unmanufactured tobacco increased, but a decline in prices reduced the value 21 per cent from 1929-30.

### SIGNIFICANT POPULATION CHANGES

Farm population in the United States showed a net increase in 1930 for the first time since 1922, when the department began making annual estimates of the number of people living on farms. From other data it appears that the indicated increase in our farm population last year was the first annual increase in two decades. For January 1, 1931, the estimate of farm population was 27,430,000, as against 27,222,000 on January 1, 1930. During 1930, it is estimated, 1,543,000 persons left the farms, as compared with 1,876,000 the previous year. On the other hand, 1,392,000 persons went from cities to farms in 1930, as against 1,257,000 in 1929. Hence the net movement from farms to cities was only 151,000 in 1930, as compared with from 576,000 to 1,120,000 in the other years since 1921. On farms, however, there is a considerable surplus of births over deaths. The surplus in 1930, it is estimated, was 359,000 persons. Balancing the gains and losses for the year, leaves a net gain in farm population of 208,000 persons.

Unemployment has greatly reduced the flow from farms to cities and has stimulated somewhat the movement of city people in search of the cheaper conditions of livelihood to be found in the country. It is, of course, impossible to say on the basis of the figures for a single year whether or not the tide has turned. Urban unemployment tends to increase the farmward movement, which diminishes again with the revival of industrial activity in cities. Undoubtedly the present trend is fraught with important agricultural consequences. It will increase the difficulty of adjusting farm production to market requirements and will weaken the urban market for agricultural goods. On the other hand it has a good side, for subsistence is more easily got in the country than in the town in periods of trade depression.

Of far greater significance in the long run for American agriculture is the tendency toward a marked decrease in the birth rate in this country and other important industrial countries. In the United States the effect of a declining birth rate is accentuated by restrictions on immigration both directly and through the indirect effects on birth rates and death rates. In the period, 1920-1930, the census reported an increase of about 17,000,000 in our population, or 16 per cent. But the gain was greatest in the early years of the decade. Up to 1923 it was nearly 2,000,000 yearly, after which a steady decline set in. At present the gain is only about 1,000,000 a year. The decrease is attributable partly to a net decline in immigration, partly to a decrease in births, and partly to an increase in deaths. The increase in deaths is due mainly to an increase in the number of elderly people in the population, rather than to a tendency for death to occur at earlier ages. It is estimated that the number of deaths annually will continue to increase because fewer children are being born and fewer immigrants, who are mostly young people, are arriving.

### Stationary Population Foreshadowed

From these and other facts, statistical authorities conclude that a stationary population for the United States is only about 30 years distant. Assuming no changes in restrictions on immigration, an increase of about 10,000,000 is expected from 1930 to 1940, of about 7,000,000 from 1940 to 1950, and of only about 4,000,000 from 1950 to 1960. If these estimates prove correct, the population in 1960 will be only about 144 000,000 or about 20,000,000 more than at present.

Significant tendencies exist in urban and rural birth rates. Only four or five of the cities with a population of 100,000 or above have enough children to maintain permanently a stationary population without accessions from the outside. Most cities have only about three-fourths of the number of children necessary to do so. With immigration practically stopped, our cities both small and large depend for their increase mainly on the natural rate of increase of the rural population. Birth rates are declining on the farms as well as in the cities, though not so rapidly. It therefore seems probable that preventing the Nation's population from actually declining may be found to depend on the development of policies that will admit of a large proportion of the population dwelling in a rural environment, even though partly or wholly dependent on nonagricultural employment.

### PUTTING LAND TO THE RIGHT USES

Large surpluses of the major farm products point to the probability that for some years little or no expansion of our farming area will be required. For the more remote future the expected drop in the rate of population increase lessens materially the prospective need for additional farm land. The reduced need for new crop and pasture lands and for farm population is emphasized by Europe's striving toward agricultural self-sufficiency. It is also emphasized by increasing foreign competition in the world's agricultural markets. Recent technical progress permits the use of semiarid areas hitherto unsuited for crop production. Increased efficiency economizes both land and labor. Changes in domestic consumption, moreover, are not such as to require a larger crop and pasture acreage per capita.

Whether we consider the foreign or the domestic situation, it seems clear that American agriculture approaches a turning point. There is urgent need to adjust our national agricultural policy, particularly our land policy, to the changing conditions and outlook. Extensive areas of public lands in the United States went into private ownership under the homestead policy during the decade or more beginning in 1913. In the war period, under the influence of high prices, agriculture was further expanded into areas where normal prices could not support it. Although there has been little expansion of our farming area as a whole during the past decade, our 500,000,000 to 600,000,000 acres of unused potential crop land, though mostly of low grade or requiring costly drainage or irrigation, are a constant incentive to overexpansion. Most of the land is in private ownership, and the owners naturally want to get it into use. It would probably be inexpedient and, perhaps, constitutionally impracticable, for the Federal Government to regulate the utilization or settlement of private lands. Much progress, however, could be accomplished through the widespread dissemi-

nation of information concerning the long-time outlook for different lines of production in various parts of the country, and concerning the uses for which particular classes of land are economically adapted. This implies an economic classification of our land resources, which should be readjusted from time to time to conform to fundamental changes in economic conditions. Such a classification would make it easier to discourage ill-advised and unnecessary expansion. It would lessen the risks of new settlement. It would designate land that should be withdrawn from cultivation and land that should be acquired for public uses. It would serve, in short, as the basis of a national land policy.

### Replanning of Research Needed

This would require some replanning of the investigational and extension work of the department and the State colleges and experiment stations. Their work would be directed more toward synthesizing research results and coordinating research activities to develop more definite conclusions concerning the economic adaptation of the different kinds of land to various possible uses.

The department has already directed a considerable share of its resources to the study of land utilization. The Bureau of Chemistry and Soils, in cooperation with State experiment stations, is classifying the soils of the Nation and studying their properties. It is investigating the extent, causes, and prevention of erosion. The Bureau of Agricultural Engineering is studying drainage, irrigation, and land clearing. The Bureau of Plant Industry investigates forest pathology. The Bureau of Entomology studies insects that injure forest trees. The Forest Service carries on research in silviculture, forest management, and methods of using timber and timber products; besides administering the grazing facilities of the national forests, it gives attention to problems of range utilization. Recently the Forest Service has expanded its research in the economic aspects of the utilization of land for forestry and grazing. It is studying forest taxation and the disposition of tax-delinquent forest lands. A general inventory is being made of the timber resources of the Nation.

About 10 years ago a Division of Land Economics was established in the Bureau of Agricultural Economics. It has devoted part of its attention to the economic aspects of land utilization. The area of our country is so large, however, that it would have been impracticable for so small a unit to undertake to work out the land-utilization problems of local areas for any appreciable part of the country. A few local studies have been made, mainly with a view to determining the character of the problems of sample areas and developing methods of investigation. The work has been mainly confined to studying the conditions that affect the need for land, and to estimating the extent of the Nation's agricultural land resources available for different purposes.

The time has come when both the Federal Government and the States should devote more attention to the task of determining for specific areas what uses of land are most economical. This is the necessary basis of rural planning. As the proper economic uses of land are determined, a vigorous extension program should be developed to stimulate individuals and communities to adjust their economic life to a sound program of land utilization.

### Emergency Conditions Demand Action

Although the attainment of agricultural prosperity will ultimately depend on the development of a more orderly and efficient system of land utilization, it is necessary to approach the problem by dealing with emergency conditions. Economic life in many farm communities has been disorganized by recent changes in the value, utilization, and ownership of land. In some areas many farms have been abandoned. The resources of many communities have been depleted by timber cutting, and unfavorable conditions of the lumber market have reacted on the value of standing timber. As a result, many farmers and holders of timberland can not meet taxes and other carrying charges. Millions of acres of farm or forest land have passed into various stages of tax delinquency. Extensive areas have been taken over by creditors through foreclosure. The fiscal problems of local governments have been intensified, and provisions for schools and other public services rendered uncertain.

In such areas the situation could be clarified through the collaboration of Federal and State agencies in determining the economic outlook for various land uses, and on this basis formulating a program of economic, institutional, and fiscal reorganization. In general, lands now in private ownership should continue to be privately owned and utilized. Where previous conditions have resulted in farms too small or too large for present conditions, reorganization plans should be developed and put in operation with the aid of local business interests and local and national credit agencies.

### Utilization By Private Agencies

In certain areas improved methods of forest management, including in some cases the consolidation of scattered tracts and cooperative measures for cutting, handling, and marketing, may permit a profitable utilization by private agencies of timber holdings and wood lots. Profitable private utilization can often be facilitated by changes in methods of taxation or assessment. Probably the Federal Government and the States should assume more responsibility for guiding land utilization and settlement and for determining the feasibility of drainage and irrigation projects. It is probable that assistance may be rendered to farm owners in the more effective disposition of the mineral resources beneath the surface of their farms. It may be desirable gradually to broaden the public acquisition and administration of lands not adapted to private utilization. Recognized objectives in public ownership of land, such as watershed protection, forest demonstration, and the provision of national and State parks and wild-life refuges should not be the only consideration. Other public objectives may well be kept in view. Sparse and scattering occupancy adds to the burden of maintaining schools and other public services. This cultivation of submarginal farm lands increases the competition farmers have to meet, frequently with no advantage to the occupants of the submarginal farms. The maintenance of permanent local forests should be promoted for farming communities needing timber and timber products, raw materials for local industries, local markets, and part-time employment of the population. Lands that can not be privately utilized without excessive soil erosion or

other wastage of natural resources should be removed from private ownership.

The existence of large areas of tax-delinquent land provides an opportunity for broadening the basis of public ownership. Where private ownership is inadvisable, such lands should not be forced into private ownership through resales. What part the Federal Government and the States, respectively, should take in the development of a broader program of public ownership is a matter for future determination. Clearly, however, Federal and State programs of acquisition should be coordinated in harmony with a definite policy of land utilization.

### Some Principal Requirements

The central problem is to correct or avoid mistakes in the major uses to which land is put and to safeguard the public interests in the utilization of the land. Summarizing, it seems desirable to—

(1) Encourage farmers who are operating poor land to find better opportunities in agriculture or other occupations. Poor land includes land which, though temporarily adapted to commercial farming, is peculiarly subject to wastage by erosion.

(2) Promote compact communities which will permit maximum economy of schools, roads, and other institutions by encouraging abandonment of areas, especially of poor land, where occupancy has become extremely scattered through abandonment, delinquency, etc.

(3) Create the conditions that will make possible the use for which the land is best adapted, including fire protection for forests, modifications in taxation, consolidation of tracts, and the necessary transportation facilities, and disseminate the requisite technical information.

(4) Insure the maintenance of the forest or range areas requisite for a permanent and stable agricultural economy in regions where agriculture is closely interrelated with forestry, or with use of the range.

(5) Discourage the overexpansion of agriculture.

(6) Prevent the expansion of agriculture into areas poorly adapted for the purpose and the development of a sparse type of settlement that will mean heavy collective costs for public services. This includes discouraging the development of irrigation and drainage by collective action except when agriculturally and economically feasible.

(7) Promote the adjustment of land valuation and the tax burden to what the particular use for which the land is adapted is capable of supporting.

(8) Develop those types of land that will contribute to watershed protection, flood control, adequate provision for future timber requirements, and the protection of range resources.

I consider the land-use program to be of such importance that I have called a national conference of farm leaders to discuss it comprehensively. This conference will be attended by representatives of this department, the land-grant colleges and experiment stations, the Federal Farm Board, State land departments, mortgage companies, farm organizations, railroads, banks, and others.

### FARM-LAND VALUES

Developments unfavorable to agriculture during 1930 were reflected by severe declines in farm real-estate values in nearly all parts of the country. Not since 1922 had values dropped in any year to such an

extent as during the year ended March 1, 1931. The index of estimated value per acre for the United States as a whole decreased from 115 per cent of the pre-war level to 106 per cent. The indicated declines were not only more severe than those of the previous year, but also far more general. Only two States escaped reductions in 1930, while in 1924 only 24 had reductions.

The sections reporting the greatest declines in farm-land values, relative to 1930 levels, were the West North Central and West South Central States. Each of these groups of States had declines averaging 11 per cent. The East North Central and South Atlantic groups each reported average declines of 9.4 per cent. The East South Central showed an 8.6 per cent decrease, the Middle Atlantic 4.7, the Mountain States 2, the Pacific States 1.4, and the New England States 0.8 per cent. The States reporting the greatest percentage of decline were Arkansas, North Carolina, Missouri, South Carolina, and Iowa.

Accompanying the downward movement of farm-land values was a general fall in the number of voluntary sales, and a striking increase in the number of forced transactions. During the year ended March 15, 1930, the average number of voluntary sales for the country as a whole was 23.7 farms per 1,000. During the year ended March 15, 1931, the average number dropped to 19 farms per 1,000. Forced sales, on the other hand, increased 25.5 per cent.

An appreciable and rather general demand for farms to rent resulted from the influence of urban unemployment, which caused city people in larger numbers to seek the cheaper food, fuel, and shelter available in the country, and discouraged farm people from moving to cities. Because of the difficulty of financing farm sales, the weak financial condition of the unemployed, and a general disinclination toward buying on a declining market, the accompanying effect on the demand for farms to buy was insufficient either to increase the number of farms sold voluntarily, or to increase appreciably the total number of sales. An increasing proportion of the farms sold voluntarily were bought by men who were formerly tenants, and by nonlocal residents.

### Decline Reflects Drop in Earnings

Farm-realty values reflect farm earning power, current and prospective. Hence, the fundamental cause of the decline in farm-property values in 1930 was the slump in farm incomes. As already noted, gross income from agricultural production in 1930 was about 22 per cent less than in the previous year, though the physical volume of production was only about 2 per cent less. It is estimated that farm-operating costs on the other hand declined only from \$3,152,000,000 to \$2,890,000,000. Wages paid to hired labor declined only slightly and taxes still less. Accordingly, the fall in net incomes was proportionately more than the fall in gross incomes. Net income available as a return for all the capital invested in agriculture, and as a reward for the labor and management of the farm operator and his family dropped to \$4,669,000,000, as compared with \$6,751,000,000 in 1929.

This net income may be considered from two standpoints. If pay for the labor of the farm operator and his family is subtracted at current wage rates for hired labor, there remains only \$573,000,000 as a return for all capital and management devoted to farming. If, on the other hand, adjustments are made for the portion of taxes and operat-

ing expenses paid by landlords, and for payments made by farm operators to nonfarmers for rent and for interest on loans made by them for use in production, the income from production not only fell short by \$346,000,000 of paying farm operators and their families a rate of return for their work equal to that paid to hired hands, but also left no return for the farm operators' own capital and management.

The renewed declines in income came at a time when the readjustment following the 1920 depression was still incomplete. Although land values had begun to show some signs of stability, the amount of land in the hands of involuntary holders was still at high levels, forced sales of farm land still held an unusually prominent place in the real estate market, and long-time financing of agriculture was conservative. The development of 1930 and 1931 have aggravated the situation, and reemphasized the importance of rehabilitated purchasing power for agriculture if further liquidation is to be avoided.

### Increase in Tenancy

Along with the increase in the holding of land by involuntary holders which has resulted from the decline in farmers' equities has come an increase in the proportion of tenant-operated farms. This proportion was 42.4 per cent in 1930 for the United States as a whole, as compared with 38.6 per cent in 1925. Increases in tenancy were reported in every State except Connecticut, New York, New Jersey, Pennsylvania, Delaware, Arizona, and South Carolina. Relatively small increases in tenancy occurred between 1910 and 1925. Rapid increases followed the depression of the nineties, partly as a result of that depression and partly because the area of good land available for homesteading was diminishing. During the half century that questions on tenure have been included in the Federal census (1880-1930), the percentage of tenant-operated farms has increased from 25.6 to 42.4. The present high proportion of tenant farms may involve significant consequences to the general welfare, and attention may well be directed to the probable social effects.

### TAXES

Farm real-estate taxes showed a slight decline in 1930 for the first time in the 17 years covered by the records of this department. Taking farm real-estate taxes per acre in 1913 as a base represented by 100, the index for such taxes was 249 in 1930, as compared with 250 in 1929. In amount the decline was insignificant, but it indicated a halt in the long upward trend. It did not bring any measurable relief to the farmers because agriculture's capacity to carry the burden declined far more. As we know it to-day, the farm-tax problem is largely a development of the last decade and a half. Taxes increased steadily from 1920 to 1929, inclusive, though farm earnings were low and farm valuations persistently declined. The situation was bad enough before the current depression began. It is critical now.

In the main the farm-tax problem rests with State and local governments, which in many instances are recognizing the fact in practical ways. Forty-four State legislatures met this year, and most of them considered taxation in relation to agriculture. Relief measures advocated, and in some cases enacted, fell broadly in two categories: Those designed to shift part of the cost of State and local government from

general property to incomes and other sources of revenue, and those designed to reduce public expenditures. Property taxes rest principally on real estate; hence farmers and other real-estate owners are generally required to pay more than their fair share. This injustice is coming to be widely recognized, and State income taxes are proposed as a partial remedy.

Idaho, Utah, and Vermont this year joined the list of States having personal and corporate income tax laws. Vigorous but unsuccessful attempts were made to introduce the income-tax principle in several other States. Oklahoma's income tax law was made more effective by an increase in the rates. North Carolina, Missouri, and Wisconsin likewise increased their income-tax rates. Several States increased their gasoline taxes. Some of them arranged to apportion part of the new revenue among minor civil divisions to help defray the cost of local roads. Nearly all of the revenue collected in gasoline taxes in 1929 was devoted directly or indirectly to the construction and maintenance of rural roads and city streets.

### Legislative Measures Taken

Practically all the States whose legislatures met this year dealt in one way or another with the problem of reducing public expenditures. Various expedients were adopted. Taxing authorities showed themselves keenly aware that a cut in the amount of the tax burden is as necessary as a more equitable distribution of the load. They were particularly impressed with the growth of tax delinquency. Much land over large areas reverted to public ownership through the inability of its former owners to pay the taxes. In northern portions of the Lake States the tax base of many local governments has shrunk so much that the continued existence of these governments is threatened. Inflexible taxes that take no account of crop failures, price declines, and other causes of distress have precipitated widespread farm insolvency. In such circumstances local budgets have to be pared through sheer necessity, and tax systems must be modified and improved.

Taking the country as a whole, the work of tax reform is barely begun. Nearly four-fifths of all State and local taxes are derived from the general property tax. When real-estate values fall as they have done in the United States since the war, assessments decline much less rapidly, and tend to exceed the current selling value of the land. The necessary twofold remedy, consisting of reduced public expenditure and the development of new sources of revenue, should be invoked for reasons of expediency as well as of justice.

### AGRICULTURAL CREDIT

Local farm-credit facilities, barely adequate in normal times, were unprepared to handle the situation resulting from the 1930 drought and recent depression in farm prices. Accordingly, Congress passed legislation to supplement existing credit facilities. It appropriated emergency funds the administration of which was placed in the Department of Agriculture. All told, the final session of the Seventy-first Congress assigned \$67,000,000 for various forms of agricultural credit. It made \$45,000,000 available for loans to farmers who suffered from the 1930 drought. This money was for loans for the pur-

chase of seed, feed for livestock, and fertilizer. An additional \$2,000,000 was appropriated for the same general purposes in a specific area that had suffered from storm and flood in 1929. Another appropriation of \$20,000,000 was made for agricultural rehabilitation (which term included necessary items for farm production) and for loans to individuals to buy stock in agricultural-credit corporations, livestock-loan companies, and similar organizations. Advances made to assist farmers in the drought-stricken areas are dealt with in some detail later in this report. I shall deal here mainly with the other emergency credit provided to supplement the credit obtainable by farmers from other sources, such as the commercial banks, the Federal land banks, the joint-stock land banks, and the intermediate credit banks.

Though much important Federal legislation affecting agricultural credit has been put in effect during the last decade and a half, agricultural-credit conditions generally were extremely unsatisfactory this year. This was not wholly a reflection upon the existing farm-credit facilities. It resulted largely from the depressed condition of agriculture, which weakened banking institutions. More than 1,300 banks in the United States failed in 1930, and 932 failed in the first eight months of 1931. More bank failures in agricultural areas have taken place in the last few years than in any other previous equal period, though the suspensions this year included an increased proportion of city banks. The injury to agriculture was not confined to the loss of deposits; it included a great shrinkage in the amount of agricultural credit available. When local confidence is disturbed, country banks find it more difficult to draw on the larger money centers. Hence their supply of loanable funds comes to depend almost exclusively on their local deposits, which naturally decline if banking conditions seem insecure. In such circumstances, moreover, country banks are obliged to invest an increased proportion of their funds in liquid assets outside their communities as a protection against unusual withdrawals.

### Local Conditions the Controlling Factor

Some idea of the extent to which local supplies of agricultural credit have recently been reduced may be gained from the fact that in the middle of 1931 net demand deposits of member banks of the Federal reserve system, located in places of less than 15,000 population, in 20 leading agricultural States, not including California, were about 20 per cent lower than the monthly average for the period 1923-1925. Mainly this decline reflected reduced income from agricultural production. Ordinarily deposits in country banks are a revolving fund available for local loans. When the liquidation of loans made by the country bank is retarded by farm depression, the fund loses its revolving character, and even good credit risks must be refused. Emergency credit provided by the Federal Government materially relieved this difficulty. As mentioned elsewhere, Federal loans to purchase seed, feed, and fertilizer and for agricultural rehabilitation totaled approximately \$47,000,000. In addition the Federal Government advanced \$1,327,000 to individuals for the purchase of stock in agricultural-credit corporations and livestock-loan companies. Loans of this type enabled credit agencies that rediscount paper with the Federal intermediate credit banks to expand their credit facilities by several times the amount of the new capital provided. Hence the full benefit of the advances was much greater than might be supposed from their relatively small total.

Advances of this character, as already noted, were provided for in the \$20,000,000 appropriation for agricultural rehabilitation and loans to individuals to buy stock in credit institutions. Under congressional authority the Secretary of Agriculture, after conferring with officials of the Federal intermediate credit banks and the Federal Farm Loan Board, set aside \$10,000,000 for the latter purpose. A National Advisory Loan Committee, consisting of Lewis T. Tune, chairman, St. Louis, Mo.; B. C. Powell, Little Rock, Ark.; and B. F. Cheatham, Washington, D. C., was appointed to assist in administering the fund. Advisory committees were also appointed in 22 drought-stricken States to make recommendations regarding loan applications. Up to September 1, 1931, advances had been made representing 788 individual loans to stockholders in 49 credit corporations and livestock-loan companies.

### Opportunities for Credit Corporations

An important field of usefulness lies open to agricultural-credit corporations in those communities where existing local credit facilities are inadequate. They do not depend for their supply of loanable funds on local sources, but have access to the central money market through their rediscount facilities. Hence they can obtain advances on the basis of actual credit risks without being limited by the necessity of mobilizing funds locally. In 1930 the Federal Farm Loan Board made a regulation authorizing an increase from 2 and 2½ per cent to 3 per cent in the spread allowed agencies rediscounting with the Federal intermediate credit banks. In other words, it permitted rediscounting agencies to charge more for their services and consequently to provide better facilities and better management. With a 3 per cent margin between the rate of interest paid and the rate of interest received, these organizations can function more safely and more efficiently than was formerly possible. This advantage should promote the organization of more agricultural-credit corporations and should help to make capital available to farmers more cheaply and more abundantly. Acting through the Federal intermediate credit banks, they can create new channels through which loanable funds may flow readily from the principal money centers to farm communities.

### Varying Interest Spread Needed

A given operating spread might be excessive for local credit institutions in some parts of the country and yet prove inadequate in other areas. Under usual conditions, and even more so at the present time, country banks in the South and West must vary from their customary rates in order to take advantage of the rediscount privileges offered by Federal intermediate credit banks. Few bankers have deemed this a feasible policy. Funds of the Federal intermediate credit banks have hitherto reached farmers principally through agricultural-credit corporations and livestock-loan companies. With the year-round volume of business enjoyed by livestock-loan companies, the present 3 per cent operating spread may prove ample. It is doubtful, however, if it will cover the cost and losses incurred in financing the production of those crops which involve a relatively hazardous and costly type of business. In this type of financing loans are so seasonal that credit corporations can actually earn little more than half the annual rate which is charged.

Limitations on interest rates were authorized by Congress for the protection of farmer borrowers and to prevent exploitation of Federal intermediate bank credit by local credit institutions. The accomplishment in these directions, however, has been overshadowed by the failure of Federal intermediate bank credit to reach farmers in the volume needed. To a considerable extent this appears to be due to the fact that approved spreads have often failed to recognize local operating requirements. In such cases the rate limitations have obstructed the channels through which Federal intermediate bank credit might flow to farmers. A system of spreads, based on variations in local conditions and requirements, would appear to be more practicable than a uniform spread for all areas and types of loans.

### Emergency Credit Benefited Many

Congress substantially recognized the principle that agricultural credit should not depend too heavily on local funds when it created the intermediate credit banks. It took an important further step in the same direction in providing the emergency credit here described. The innovation has potentialities only faintly indicated by the extent to which the fund available for capitalizing agricultural-credit corporations has been utilized up to the present. So far less use has been made of the new facilities than was originally expected. Many interested groups had not enough time to obtain subscriptions for stock and to organize operating corporations so as to take care of 1931 crop requirements. Emergency-credit requirements of farmers in the drought area were largely taken care of in other ways, principally through advances from the \$45,000,000 appropriation for loans to purchase seed, feed, and fertilizer. Additional financing through credit corporations was consequently less urgent. Nevertheless much valuable preliminary work was done. The National Advisory Loan Committee devoted much effort to an educational campaign in which radio broadcasting, press releases, and other means were used to acquaint farmers with the advantages of organizing local agricultural-credit corporations. Farmers thus became better acquainted with what they can do for themselves by organizing to rediscount their paper through the intermediate credit banks.

The rapid readjustment which has been forced upon agriculture as a result of the marked decline in farm-commodity prices since 1920 has likewise caused material changes in the usual supply of credit available to farmers. Every effort, therefore, should be devoted to strengthening existing credit agencies, and whenever possible, consideration should be given to such measures as would tend to increase their usefulness.

### DROUGHT RELIEF

Excluding the \$10,000,000 set aside to organize new or to strengthen existing agricultural-credit corporations, the department, as already indicated, had \$57,000,000 available for drought relief. More than 385,000 applicants borrowed approximately \$47,000,000 to purchase seed, fertilizer, feed for livestock, and fuel and oil for power machinery, and for agricultural rehabilitation.

Widespread need resulted from the severe drought that prevailed during the 1930 crop-growing season. The worst effects were concen-

trated in a triangular section of the Potomac, Ohio, and Mississippi Valleys running from southern Pennsylvania, Maryland, and Virginia to southern Kansas, to Alabama, and to Texas. Neighboring States felt the drought more or less. How its effects were geographically distributed is indicated by the composite yield per acre of all crops in 17 States principally affected. This composite yield is expressed as a percentage of the average for the 10-year period 1919-1928. It was 87 in Pennsylvania, 73.4 in Maryland, 67.7 in Virginia, 56.9 in West Virginia, 79.3 in Ohio, 84.4 in Indiana, 83.1 in Illinois, 60.5 in Kentucky, 75.6 in Tennessee, 66.8 in Missouri, 62.8 in Arkansas, 89.8 in Kansas, 71.2 in Oklahoma, 86 in Texas, 91.5 in Mississippi, 100.3 in Louisiana, and 111.3 in Alabama. Yields above the 10-year average in Louisiana and Alabama are explained by the fact that only certain sections in those States were drought stricken, and that cotton, their principal crop, withstood the drought surprisingly.

In most of the drought-stricken States gross income from farm production was much below the average for the 5-year period 1924-1928. It ranged from 4 per cent below that average in Pennsylvania to 46 per cent below it in Arkansas and in Oklahoma. In Mississippi the gross income was 39 per cent below the 5-year average, in Texas 37 per cent below, and in Alabama 29 per cent below. Feed production was most affected, wheat and rye and many of the vegetable crops having been harvested before the drought became severe. Rice was not much hurt, since it is grown under irrigation. Pastures were extremely scant. In fact, for the entire 1930 pasture season the condition of pastures in the drought States was only from 50 to 80 per cent of the 10-year (1920-1929) average. Short supplies of grain and hay and poor pastures reduced the output of animal products materially. In the 17 States mentioned, milk production per cow on August 1, when the drought was at its height, was 11.3 per cent below the output on August 1, 1929. Egg production per hen was 9.5 per cent lower. Nevertheless, the production of milk and eggs in these States for the full year 1930, with some exceptions in South Central States, was above the average of the 5-year period 1924-1928, both in total volume and in output per cow and per hen. A mild autumn and winter enabled farmers to economize their livestock feeds, and the drought did not seriously affect the meat supply of 1930. In some areas it temporarily increased market supplies through forced marketing. Beef production in the 17 States was slightly greater than in the previous year; and sheep and lamb production was greater also. The production of calves and hogs declined, but not as a result of the drought.

### Much Privation Caused

Statistics, however, give a poor impression of the human side of the drought situation. Tens of thousands of farm families had their savings swept away, and even their subsistence endangered. Usually when weather conditions reduce production prices rise. No such partial compensation came to the drought-stricken areas in 1930 because demand and prices declined under the impact of the world depression. For the little they had to sell farm families got extremely low unit prices. Feeds had to be moved into deficit areas, and in many localities it was necessary also to supply food. Aid was rushed by the Red Cross and by State and local agencies. It was supplemented by Fed-

eral action when Congress, on December 20, 1930, passed the first drought-relief resolution and charged this department with the administration of the funds provided.

Field offices for the handling of applications for loans were established in Washington, D. C.; Memphis, Tenn.; Fort Worth, Tex.; St. Louis, Mo.; and Grand Forks, N. Dak. The making of loans began about February 1, and continued at a rapid rate through the late winter and early spring months. Several hundred temporary workers were employed in these field offices in handling the applications for loans, and valuable assistance was given in the examination of applications by a large number of district agents and specialists from the State extension forces. Loans were made in 1,646 counties in 31 States.

In each county a local seed-loan committee was set up, usually consisting of a prominent banker or other business man and two leading farmers. These committees examined all applications for loans originating in their counties and made recommendations thereon to the department field offices. On approval of the applications for loans at the field office, payment was made to the borrower by check, the transaction in a large proportion of cases being completed in less than a week from the time application was made. As borrowers did not need all their funds immediately on the approval of their applications, payments in many cases were made in two or more installments, as funds were required. These installments were paid only after the receipt of a report from the borrower as to the purposes for which the initial advance had been expended.

All applicants for loans were required to agree to plant a garden, and also a sufficient acreage of feed crops to provide feed for their livestock. This policy was in line with that generally advocated by the agricultural colleges and extension forces in the Southern States, and followed also by many agencies that assist in financing farmers.

#### Loans from the Various Appropriations

Out of the \$45,000,000 appropriation, 279,466 loans were made aggregating \$39,716,797. Out of the \$20,000,000 appropriation, 91,075 loans for agricultural rehabilitation were made aggregating \$5,430,783. Out of the \$2,000,000 appropriation, 14,651 loans were made, aggregating \$1,908,181. All told, 385,192 applications were approved for loans aggregating \$47,055,761.

As loans were made from the rehabilitation fund to many farmers who had already borrowed from the \$45,000,000 appropriation, the number of individuals to whom loans were made is somewhat less than the total shown. On the other hand, many loans were made to landlords, each of whom financed several farm families, so that the total number of farm families financed was probably between 350,000 and 400,000. The average loan was slightly less than \$150, and in certain States, such as Oklahoma and Kentucky, the average was less than \$100. The small size of these loans shows clearly that farmers generally economized on production expenses and conducted their farming operations in 1931 at the lowest possible cost.

Federal and State extension forces helped farmers, not only in using wisely the money advanced to them, but in utilizing other resources. Farm men and women were urged to plant fall gardens of rapidly maturing vegetables. They were shown how to preserve poultry, beef, vegetables, and eggs. They were advised about cheap, wholesome

foods. As a result the food problem was made less difficult. Meat canning relieved many farmers of the necessity of purchasing feed for their animals, or of selling them at low prices, and at the same time provided a meat supply. Farm women were taught how to renovate and remodel old garments. Practical help was given also in the choice and use of emergency rations for livestock. Farmers were assisted in culling their herds and flocks and encouraged to plant forage crops for fall and spring pasture.

### Feed and Forage Supplies Located

Extension agents located supplies of feed and forage, and worked out plans for distributing feedstuffs at the lowest possible cost. County agents helped farmers to get the benefit of reduced freight rates granted by railroads on the movement of hay, feed, and water into drought areas, and on the outward movement of livestock. They and other representatives of Federal and State agencies promoted crop adjustments suited to market needs. In the wheat States they urged the elimination of wheat as a major source of income on farms of poor soil or difficult topography. In the cotton States they emphasized the necessity of a balanced system of agriculture with feed and food crops holding an adequate place in the crop organization.

TABLE 1.—*Loans made to individual farmers in each of the States most seriously affected by drought*

State	From \$45,000,000 appropriation		From \$20,000,000 appropriation		From \$2,000,000 appropriation		Total	
	Number	Dollars	Number	Dollars	Number	Dollars	Number	Dollars
Alabama.....	14, 406	2, 211, 480	3, 812	193, 649	1, 535	267, 438	19, 753	2, 672, 567
Arkansas.....	51, 831	7, 806, 443	28, 675	1, 604, 661			78, 506	9, 211, 104
Georgia.....	13, 231	1, 976, 690	321	14, 503	4, 126	545, 877	17, 678	2, 537, 070
Indiana.....	5, 660	777, 542	888	25, 388			6, 088	802, 930
Kentucky.....	25, 129	2, 247, 645	8, 103	340, 431			33, 237	2, 588, 076
Louisiana.....	15, 392	2, 497, 342	10, 205	698, 093			25, 597	3, 190, 435
Mississippi.....	21, 738	3, 697, 495	9, 868	741, 879			31, 606	4, 439, 374
Missouri.....	15, 029	2, 031, 140	3, 067	271, 642			18, 116	2, 302, 782
Montana.....	8, 027	2, 071, 210	92	10, 030			8, 119	2, 081, 240
North Carolina.....	12, 927	1, 903, 235	3, 436	153, 855	970	153, 912	17, 333	2, 211, 002
North Dakota.....	8, 304	1, 597, 587					8, 304	1, 597, 587
Oklahoma.....	14, 770	1, 397, 377	4, 099	224, 517			18, 869	1, 621, 894
South Carolina.....	586	59, 139			7, 620	895, 009	8, 156	944, 145
Tennessee.....	16, 673	1, 566, 903	7, 394	439, 869			24, 067	2, 006, 772
Texas.....	20, 379	2, 582, 556	9, 178	502, 927			29, 557	3, 085, 483
Virginia.....	16, 467	2, 179, 033	3, 563	175, 134			20, 030	2, 354, 167
West Virginia.....	5, 551	522, 480	495	18, 098			6, 046	540, 578
Total.....	266, 040	37, 255, 294	90, 721	5, 409, 476	14, 251	1, 862, 236	371, 012	44, 527, 008
All other States.....	13, 426	2, 461, 503	354	21, 307	400	45, 945	14, 180	2, 528, 755
Grand total.....	279, 466	39, 716, 797	91, 075	5, 430, 783	14, 651	1, 908, 181	385, 192	47, 055, 761

### UNEMPLOYMENT RELIEF

Congress also appropriated large sums to the Department of Agriculture for types of work that contributed to unemployment relief. In most cases the funds appropriated were additions to moneys that would ordinarily have been provided for department activities. In some cases, however, department activities were anticipated by making funds, which ordinarily would not have been available until after July 1, 1931, available during the winter and spring months, for the relief of unemployment. Increased funds were provided for the con-

struction of Federal-aid highways, for roads and trails in the national forests, and for roads traversing the public domain. Various sums were made available to give employment in the repair, construction, and improvement of laboratory buildings, farm facilities, forest-protection facilities, and other equipment used in the department's research and service work. Altogether more than \$100,000,000 was appropriated for objects related to unemployment relief. Emergency employment was directly provided for varying periods for nearly 200,000 men, and indirectly for a much larger number in industries supplying necessary materials and services. Where possible in employing men the department gave preference to the heads of families.

Federal-aid road construction was accelerated as early as April, 1930, when Congress authorized for this purpose an additional \$50,000,000, bringing the total Federal contribution for Federal-aid roads to \$125,000,000 effective with the fiscal year 1932. The actual amount expended in the fiscal year 1931 from the regular Federal-aid highway appropriations was approximately \$135,600,000, including some \$26,000,000 from the \$125,000,000 appropriation for 1932, which was made immediately available. This fund provided work for farmers distressed by the 1930 drought, as well as for unemployed urban workmen. A full discussion of unemployment aid resulting from the enlarged program of the Bureau of Public Roads is given in the next section of this report.

### Work in National Forests

Road work in the national forests provided considerable employment. Forest improvement already under way was speeded up, and \$3,000,000 was added to the regular fund for the construction of forest roads and trails. This work created a need for more equipment, such as tractors, graders, power shuttles, compressors, rock crushers, and trucks. In the first half of the current year the department purchased \$145,000 worth of such equipment. Where unemployment was extreme the department rotated available men in construction crews. For the fiscal year 1932, \$800,000 was made available to build a forest products laboratory at Madison, Wis., and \$150,000 for white-pine blister rust control in addition to the usual appropriation for that purpose.

Various measures to relieve unemployment were adopted by the Forest Service. In Arkansas, for example, many farmers living in or near a national forest faced destitution. In this area several hundred men were enabled to support their families by cutting and selling stove bolts. Other men were employed in making silvicultural cuttings to improve the timber growth. For this purpose one forest supervisor disbursed \$12,000 in wages during a 4-month period, giving work to those who needed it most. Construction plans were modified where possible to permit forest road building during the winter. In some places construction crews were alternated. When emergency funds became available for forest improvements action was started in all the national forests and plans made looking toward the progressive equipment of the forests with roads, trails, lookout houses and towers, telephone lines, firebreaks, cabins, barns, inclosed pastures, and drift fences. Comprehensive plans for carrying on such work make it possible to forward it as circumstances warrant. Decentralized organization gives the Forest Service machinery for getting new work under

way rapidly under the supervision of trained local men. As soon as plans for the use of the \$3,000,000 emergency appropriation were completed, allotments to each region were telegraphed to regional foresters and to forest supervisors. Awards for the purchase of equipment followed and in some cases equipment was on the ground within 10 days. By the end of January, 1931, 3,083 men had been given employment under the appropriation; by the end of May the number had increased to 4,558.

Additional funds for emergency improvement by the Forest Service became available under an act approved February 6, 1931, which set aside \$354,800 for insect-control work, forest administration, and range improvements on the national forests. In the regular agricultural appropriation act of February 23, 1931, a provision was included making available immediately certain 1932 appropriations, mainly for forest protection. In June, 1931, the total number of men employed in this work, including those who were given temporary employment through the use of regular 1931 appropriations, was 21,658. By the end of the fiscal year, practically all the emergency funds had been expended or obligated, and about half of the 1932 appropriations made available for use in 1931 had been expended.

#### Other Emergency Appropriations

The emergency appropriations also included \$300,000 to the Bureau of Biological Survey for the fiscal year ended June 30, 1931, for building dams, fences, telephone lines, electric, water, and septic-tank systems, and cold-storage plants; for surveys of wild-life refuges; and for the control of injurious rodents and predatory animals. About two-thirds of the expenditures made from this appropriation were for personal services. An emergency fund of \$75,000 was provided for the construction and improvement of farm and laboratory buildings required by the Bureau of Plant Industry, and for necessary installations in connection with the field activities of that bureau. An appropriation of \$35,000 was made for construction, by the Plant Quarantine and Control Administration, of a car-fumigation plant at Presidio, Tex. A \$58,000 emergency fund was made available to the Bureau of Animal Industry for construction and development work at its farms at Beltsville, Md., and Miles City, Mont. Employment was furnished by the bureau to many men in clearing land, establishing pastures, building fences, and in constructing laboratories and other buildings. A total of \$87,000 was made available to the Bureau of Dairy Industry for the construction of buildings and other improvements at dairy experiment stations at Beltsville, Md., Woodward, Okla., and Ardmore, S. Dak. Appropriations aggregating \$83,480 were also provided for improvements to the department's buildings in Washington, D. C., including the modernization of its elevator and electrical systems, resulting in additional employment opportunities.

Other bureaus in the department helped to relieve unemployment or to mitigate its effects. The Bureau of Home Economics, for example, prepared economical and healthful food budgets, and carried on necessary educational work, in cooperation with the Extension Service. They cooperated with the American Red Cross in ascertaining the types of help needed and the resources available. More than 750,000 bulletins and posters were distributed in drought and unemployment relief work.

## PUBLIC ROADS

Between January and September there were employed on Federal-aid road construction and road construction in the national forests and parks an average of 100,000 men. During this period these men worked the equivalent of 150 days at an average wage of \$4 per day. On this road work, in which the Federal Government participated either as a cooperator with the States or independently, there was paid to labor employed directly on the roads approximately \$60,000,000.

Actually the number of men employed varied during the period from a minimum of 31,000 in January to a maximum of 164,700 in July. By April there were 97,500 at work, and during the active construction season from May to August, inclusive, the number averaged nearly 150,000.

These figures represent the employment offered directly in the construction of the roads. For every person employed directly there are probably at least two indirectly employed in the production and transportation of road materials and equipment. If that be the case, the road-building work in which the department participated occupied an average of approximately 450,000 men during the active season, and the equivalent of 300,000 men for the period from January 1 to September 1, 1931.

The increase in employment offered on Federal and Federal-aid road work this year is indicated by comparison of the 154,450 persons reported as employed directly during June, 1931, with the 64,000 employed during the same month of 1930.

The increased employment afforded by the road work during the fiscal year 1931 is the result of the increased appropriations authorized, the early apportionment of the Federal-aid authorization, and the emergency legislation of December 20, 1930, especially the \$80,000,000 appropriated as an advance to the States to be used by them in lieu of State funds in order to get work under way early in the calendar year 1931. This appropriation is not an outright grant, but merely a loan which the States are to repay over a period of five years by deduction from their future apportionments of regular Federal-aid funds beginning in the fiscal year 1933.

### Cooperative Projects Give Greatest Aid

Although the independent Federal construction on national-forest and national-park roads was increased, the Federal-aid road work in which the cost was shared with the States provided by far the greatest amount of employment, and the increase in volume of this work during the fiscal year is the result of three separate actions

### Increased Appropriations

First was the authorization of an additional appropriation of \$50,000,000 for the fiscal year 1931. This addition, bringing the total authorized for the current fiscal year to \$125,000,000, was approved April 4, 1930, and immediately apportioned. It had the prompt effect of increasing the work undertaken during the summer of 1930.

On September 1, 1930, the appropriation of \$125,000,000 authorized for the fiscal year 1932 was apportioned. Normally the apportion-

ment would not have been made until the latter part of December. The advancement of the date added to the amount of work undertaken during the autumn and carried over as the bulk of the work current during the early months of 1931.

Stimulated by the enlarged Federal-aid apportionment, the volume of construction work carried on and completed during 1930 was further increased by the exceptionally long, dry working season. This resulted in an abnormally large expenditure, and left many States with seriously depleted revenues which could not be renewed except by action of the State legislatures. As in many cases the sessions of the legislatures were not convened until after January 1, it seemed probable in December that unless some further action was taken by the Federal Government the resumption of construction work in the spring would be delayed because of a lack of State funds with which to match the available Federal apportionments.

### Congress Authorizes Advance in Program

To avoid this possibility Congress, on December 20, appropriated \$80,000,000 to be apportioned among the States in the same manner as the regular Federal-aid authorizations and used by them to match the Federal-aid funds. As it was the purpose to encourage the beginning of work as promptly as possible in order to provide early relief to the unemployed, the amount of the apportioned funds which the States could claim was limited to the amount that should be actually expended by September 1.

This method of stimulating and advancing the construction program proved effective. Within a month \$15,000,000 of the emergency fund and \$14,500,000 of regular Federal aid had been allotted to new projects. The Federal-aid roads under construction, aggregating a little over 8,800 miles at the end of January, increased to nearly 10,400 miles by the end of March. This was virtually as much as the mileage under construction by the end of July of the preceding year; and by June 30, the end of the fiscal year, construction work was in progress on nearly 16,500 miles.

Nearly \$75,000,000 of the \$80,000,000 emergency appropriation had been allotted to projects by May 31; and by August 31, the limiting date set by Congress, virtually the whole amount appropriated had been earned by completion of work. Until the last vouchers are received from the States the exact amount earned can not be ascertained.

### Road-Construction Progress

During the fiscal year 1931 Federal-aid projects involving the improvement of 11,033 miles of road were completed. Of this mileage, 7,939 miles were initially improved; that is, the improvements completed were the first to be made with Federal aid on the particular roads involved. Advanced stages of construction, adding a further degree of betterment to roads previously improved to some extent with Federal aid, were completed on 3,082 miles; and 12 miles built a number of years ago with Federal assistance were reconstructed.

The total mileage improved with Federal aid to date and classified as completed, excluding 4,174 miles which was undergoing stage construction or reconstruction at the end of the fiscal year, is 88,713 miles.

Of this completed mileage, nearly 390 miles consisted of bridges over 20 feet in span and their immediate approaches. The remainder of 88,323 miles was made up of roads variously constructed according to the requirements of traffic and the means available in each particular case. Roads totaling 36.626 miles were improved with high-type surfaces of bituminous macadam, bituminous concrete, Portland-cement concrete, and vitrified brick and other block pavements. These are types of improvement suitable for the most heavily traveled roads.

Roads of intermediate traffic density, totaling 4,529 miles, were improved with macadam, various low-cost bituminous mixtures, and bituminous-treated gravel surfaces. On 35,920 miles of less heavily traveled roads, surfaces of gravel without bituminous treatment and sand-clay and topsoil surfaces were laid, and 11,248 miles were improved merely by grading and draining. All of the last class of improvements are approved upon the definite understanding that surfaces adequate to meet traffic requirements will be laid as promptly as possible. The roads thus improved and those on which low-type surfaces have been built are the sections of the system upon which subsequent stage-construction operations will be conducted.

#### Work in Progress at End of Fiscal Year

At the close of the fiscal year work was in progress on 16,481 miles of road. On 12,306 miles the work under way was the first work to be done with Federal aid; on 4,139 miles the work consisted of an advanced stage of construction added to an improvement previously made with Federal aid; and on 36 miles the work was reconstruction.

The 11,033 miles completed during the fiscal year were built at a total cost of \$255,088,414.09, toward which the Federal Government contributed \$105,918,451.14 and the States the balance. Not all of the Federal contribution to these roads was paid during the past year. Payments were made for work done upon them throughout practically the entire period of their construction, which on many projects considerably exceeded a year.

But the payments actually made to the States during the year on these completed projects and others still under construction exceeded the amount involved in the completed projects and reached the total of \$133,340,910.64. This is the largest sum of Federal-aid money ever paid to the States in a single year. It exceeds by nearly \$12,000,000 the recently increased apportionment of \$121,875,000.

This heavy disbursement, made possible by the existence of a relatively small unexpended balance from previous fiscal years, is another indication of the extent to which the Federal-aid program has been enlarged in the effort to furnish additional employment. So high a rate of expenditure can not be long continued, however, because the expenditures must be kept within the amount apportioned when all accumulated balances have been exhausted.

#### Forest Highways

In the national forests improvements were completed on 281 miles of the forest-highway system, bringing the total improved to date to 4,638 miles. The forest highways are the most heavily traveled of the roads traversing the forest areas. They comprise a system, which has been designated in cooperation with State highway officials, aggregating

15,024 miles. Of this mileage, 8,787 miles consist of roads which are necessary sections or extensions of the Federal-aid system, and 6,237 miles serve communities within the forests.

For this work also the appropriation authorized for the fiscal year 1931 was increased. For all road work in the forests in 1930 the authorization was \$7,500,000. Of this sum, \$3,000,000 was reserved for the improvement of roads and trails needed for the administration and protection of the forests themselves, and the balance of \$4,500,000 was available for the roads more extensively used by the public. For 1931 the whole authorization was increased to \$12,500,000 and the amount for forest highways to \$9,500,000, the sum reserved for trails remaining \$3,000,000. The act of December 20, 1930, also carried an appropriation of \$3,000,000 to further increase employment on forest-highway work.

As a result of these increased appropriations the forest-highway construction program has been rapidly expanded. The entire amount of the emergency appropriation was obligated by June 30, and there was placed under construction a mileage of projects to be financed with the other available funds exceeding the corresponding mileage in the preceding year by 75 per cent.

The difficulties of location and construction and the short working season entailed by the altitude and isolation of many of the forests have prevented as rapid an expansion of the construction program as was possible in the case of Federal-aid roads; but considering these circumstances, the progress made in this work is very substantial.

### NEW CONTACTS WITH FRUIT AND VEGETABLE INDUSTRIES

The passage of the perishable agricultural commodities act, signed June 10, 1930, opened to the department a new field of usefulness to the growers and handlers of fresh fruits and vegetables. This act is designed to suppress unfair and fraudulent practices, to prohibit fraudulent charges, unjustifiable rejections or failures to deliver, and to prevent the discarding or dumping of consigned products without reasonable cause. As a means to this end, handlers of fresh fruits and vegetables moving in interstate or foreign commerce in carload quantities were required to obtain licenses from this department. Violations of the act may be punished by the suspension or revocation of licenses or by publication of the facts. Redress for parties injured by violations of the act may be secured through reparation orders issued by this department after the determination of the facts by investigation and public hearing.

By the close of the fiscal year, 15,180 licenses had been issued. Approximately 1,500 requests were received for the investigation of disputes. Of these, more than 800 were satisfactorily closed. Action by the department's solicitor was invoked in 102 cases; the remainder are pending. Under an earlier enactment, the produce agency act, 296 complaints were received and 217 closed. Thirteen cases went to trial in the United States courts, all of which resulted in convictions.

In the informal handling of many hundreds of cases the department has been able to strengthen the position of that large element in the fruit and vegetable trade which has been striving for many years to improve the business ethics of the industry.

## AGRICULTURAL ENGINEERING

Full realization of the possibilities of machinery in agriculture calls for the removal of impediments to machine operation, and in fact for all such modifications of the physical aspects of farms as are necessary to promote economical and scientific management. This is a problem in agricultural engineering. It is being studied, with related problems, by the Bureau of Agricultural Engineering. This bureau, authorized by the last Congress, began its existence on July 1, 1931. It is new, however, only in being a separate bureau. Agricultural engineering work in the department goes back to 1898, when Congress first appropriated money for "irrigation information." Provision was later made for the study of drainage problems. In 1915 the scope of agricultural-engineering research in the department was widened to include a study of farm machinery and farm buildings. Originally the work was divided among different bureaus. In 1925 it was consolidated in the Division of Agricultural Engineering in the Bureau of Public Roads, and reached proportions that suggested the advisability of intrusting it to a distinct bureau.

Sound engineering is indispensable to the economical use of land. This is as true for the small farm as for the large. In fact, the immediate task of the Bureau of Agricultural Engineering is to promote the welfare of our six and a quarter million small-farm operators. It will strive specially to serve the needs of the family farm, particularly in such matters as the construction of farm buildings, the proper choice of farm machinery, the improvement of farm water supplies and farm sanitation, the control of insects and plant diseases by mechanical means, the preservation of farm products by refrigeration, and the prevention of soil erosion. Three problems are outstanding in connection with farm buildings—the need of remodeling farm homes; the improvement of livestock barns, particularly dairy barns; and the provision of more and better farm storage. In connection with farm machinery, considerable work to supplement progress already made is necessary in the mechanical control of the European corn borer and in the more efficient mechanical distribution of fertilizers. Studies in irrigation will be broadened. In irrigation studies the big problem is the conservation of water, rather than the irrigation of additional land. Agricultural engineering may help to prevent soil erosion by developing better terracing methods, and also by indicating desirable changes in machinery designed for use on terraced fields. Improved engineering practices can materially reduce farm costs of production.

## ANIMAL-INDUSTRY INVESTIGATIONS

The livestock industry continues to be a valuable balance wheel to agriculture, especially in utilizing crops produced in excess of human requirements. Though low prices have prevailed for food animals this year, stock raising is essentially in a sound and stable condition. Losses from diseases, parasites, and other causes are being steadily reduced, and research dealing with the economy of production is giving new information of public interest and practical value.

Beef-cattle range studies, conducted during the year in cooperation with State experiment stations, showed that materially larger calf crop are obtained from pasture breeding than when the cows are bred on

open range or forest reserves. The number of calves alive at weaning time was from 7 to 11 per cent greater in the case of the pasture-bred lots.

Attention was given to beef-cattle production and meat utilization in southern areas recently released from the cattle-tick quarantine. As a result, increased numbers of cattle were fattened on grain, and the production of higher quality meat rose in many localities. The work resulted in a greater production of feed crops suitable for beef production. Also the number of purebred beef bulls used in the area increased.

Experiments in lamb production again demonstrated the advantage of giving ewes extra feed at breeding time, a practice known as flushing. For this purpose good pasture proved superior to all other feeds. Ewes flushed on extra-good pasture produced 164 lambs per hundred ewes. Those fed grain produced 152 lambs per hundred ewes. Those not given any extra feed at breeding time produced only 143 lambs per hundred ewes.

It has long been customary to feed market hogs all they will eat, to bring them to desired market weights as quickly as possible. In recent investigations, however, limited feeding resulted in more economical pork production. Hogs fed a limited ration made less rapid gains, and required longer feeding periods. But they were more efficient in utilizing their ration and required much less feed per hundred pounds of gain than did those fed a full ration. Moreover, limited feeding produced somewhat leaner carcasses, an advantage since the taste of the American consumer is gradually turning toward leaner pork. These results offer the producer additional means of reducing pork-production costs when market conditions are favorable to a longer feeding period.

Swine-breeding investigations showed, contrary to the general opinion, that crossbreds are not always superior to purebreds in vigor and gains. It was found also that fertility and low mortality were more important factors in economical swine production than minor differences in type and rate of gain.

Meat investigations, conducted by 3 department bureaus cooperatively with 22 experiment stations, continued to throw new light on the factors which make meat tender, palatable, and otherwise desirable from the consumers' standpoint. These results suggested carefully planned performance studies, which were begun during the year, to identify and improve superior strains of meat animals within a breed. Consideration is being given not only to production efficiency, but to carcass yields and quality of meat produced.

Much attention was given to means of increasing the hatchability of hens' eggs. The results obtained were superior to those of previous years, in part because the breeding stock had been selected on the basis of hatchability. A study of the effect of egg production on hatchability showed that a large production of eggs during the breeding season is apparently conducive to good hatchability.

### Bovine-Tuberculosis Eradication

The extensive Federal-State task of eradicating tuberculosis from livestock is steadily progressing. The degree of infection among cattle was more than 4 per cent at the beginning of the campaign 13 years ago. The corresponding figure for 1931 was only 1.5 per cent. More than 13,000,000 cattle were tested during the last fiscal year, out of

which number 203,778 proved to be tuberculous as indicated by their reaction to the tuberculin test. The elimination of these animals removed a menace to the public and to the livestock industry.

The method of area testing by which all the cattle in a given unit, generally a county, are tested within a short time again proved effective and economical. At the end of the fiscal year 1,223 counties (and 50 towns in Vermont) had completed one or more tests of all cattle within their borders, and had been officially designated as modified accredited areas. This term signified that bovine tuberculosis has been reduced to one-half of 1 per cent or less and that all reacting cattle have been removed. Four entire States—North Carolina, Maine, Michigan, and Indiana—have been freed of bovine tuberculosis by the area method.

Records of Federal meat inspection indicated further reduction in the number of cattle and hogs condemned as unfit for food because of tuberculosis. This reduction reflected important savings to livestock producers through reduced infection on farms. The benefit will continue, provided owners cooperate with livestock sanitary authorities in preventing reinfection.

The present time is opportune for tuberculosis-eradication work even in highly infected areas. Dairy cattle can be obtained at moderate cost for replacement purposes. Hence the removal of reactors from herds is cheaper than during times of higher prices for cattle and cattle products. Moreover, the indemnity paid and the salvage value received reduce the loss to a low figure in proportion to the benefits of having healthy herds. The average combined Federal and State indemnity paid last year was approximately \$65. In addition owners received a salvage value of about \$25 for the average reactor.

The demand for tuberculin testing in most States continued to exceed the facilities for meeting it, and waiting lists were necessary. Sporadic opposition decreased, largely because of a better understanding of the benefits of eradicating bovine tuberculosis. Court decisions favored the continuance of testing where the authority to do the work or the accuracy of the tests had been questioned.

### Tuberculosis of Poultry and Swine

The elimination of tuberculosis from poultry and swine also received added attention, and plans were made for active eradication work in the more seriously infected areas. Farmers in some States have received 2 cents a pound less for their poultry because of the presence of the disease in a large number of fowls marketed. Such losses stimulate interest in the eradication work. Hogs are commonly slaughtered so young that tuberculous lesions are rarely extensive. There is nevertheless a heavy loss owing to the condemnation of hog carcasses and parts, and to the special handling that infected hog carcasses must receive in federally inspected slaughtering establishments. Hogs contract tuberculosis from both cattle and poultry. Hence the suppression of the disease in cattle and poultry is essential to its elimination from hogs. Meanwhile, losses can be reduced by methods of feeding and management that protect cattle, hogs, and poultry from sources of infection. The continued cooperation of livestock owners and the public is earnestly being sought to the end that progress in eradicating this disease may be still further hastened.

### Animal Parasites Yield to Science

Of 15 Southern States formerly infected with the cattle-fever tick, only 4—Arkansas, Florida, Louisiana, and Texas—still have quarantined areas. Instead of constituting one solid block, as formerly, the tick-infested region has now been split up into three separate parts bounded by free areas in which sentiment is favorable for an early completion of the entire eradication program.

The department is combating other parasites that hamper stock raising. On the Pacific coast liver-fluke control work, begun on a small scale three years ago, has been extended in California and introduced into sections of Oregon, Nevada, and Arizona. Before the work began ranchers in California suffered severe losses, and sheep raising practically ceased in several areas. Demonstrations by department workers encouraged stock owners to use the system advised for controlling liver-fluke disease, which consists in the destruction of snails on pastures by the application of copper sulphate, and the medicinal treatment of affected animals. Losses were rapidly checked. Where the recommendations were strictly followed, the disease disappeared. Sheep raising was made a dependable enterprise, and sheep a stable security for bank loans. Liver-fluke control has resulted also in material savings in feed and in a more economical production of lambs.

In the Middle West the department's system of preventing the infestation of hogs with roundworms and other parasites has been widely used. Reports show that success in producing hogs varies almost directly with the degree of attention given to sanitation. The cost of swine production was reduced in some instances by approximately one-third.

The program of combating parasitic diseases in livestock and poultry is directed largely along two lines: Research on the life cycles of parasites as a basis for control and preventive measures, and the investigations of remedies. These investigations have revealed essential facts concerning numerous other important parasites, such as kidney worms, nodular worms, and lungworms of swine, and various species of roundworms and tapeworms of poultry. Practically all the remedies used for combating the external and internal parasites of livestock in the United States and abroad have been either discovered or standardized by investigators in this department.

### Livestock Regulatory Work Constructive

Though certain forms of Federal regulation are accepted by producers and the public as a necessary protection, a better understanding of this branch of the department's work is highly desirable. Greater knowledge of it should help to prevent both inadvertent and wilful violations. Compliance, in turn, increases the effectiveness of the work which has proved to be highly constructive in its effect on the industry.

In administering the packers and stockyards act, the Secretary of Agriculture has supervision over various practices and conditions, including commission rates and yardage charges. When investigation indicates such marketing costs to be unreasonable, he may order changes. Recent department orders, affecting yardage charges at two markets and commission rates at a third, are estimated to save shippers approximately \$345,000 a year. The settlement of disputes and complaints regarding the quality and weight of feed, alleged shortages, and

the "switching" of animals receive attention. The testing and maintenance of scales for weighing livestock at designated markets are under supervision, and many improvements in the installation of scales have been made. At the close of the year 91 stockyards were "posted" as coming within the jurisdiction of the packers and stockyards act.

Federal meat inspection has increased public confidence in the wholesomeness of meats bearing the Federal stamp of approval. This hygienic service covers the slaughter, and conversion into meat, of about 74,000,000 animals annually. It also helps in the development of a foreign market which, in the absence of inspection, would be largely closed to meat from the United States. During the last fiscal year, 66,436 official meat-inspection certificates were issued, to cover the exportation of more than 900,000,000 pounds of meat and meat-food products. Approximately 33,000,000 pounds of meat and meat-food products offered for importation from foreign countries was inspected. Approximately 300,000 pounds, principally beef, was condemned or refused entry.

Establishments that produce vaccines, serums, and other veterinary products are licensed and inspected. The use of such products, among which anti-hog-cholera serum is the most familiar, enables stockmen to raise a greater proportion of their animals to maturity or market size. The production of clear anti-hog-cholera serum last year increased 19 per cent over that of the preceding year, the total production of all anti-hog-cholera serum increasing less than 5 per cent.

Livestock are admitted into the United States only from countries free from important livestock maladies, and then only in accordance with a system of certificates, inspection, and other means of control. Similar restrictions apply to many products such as hay, other feeding materials, hides, skins, and other articles associated with livestock. Animals shipped in interstate commerce are likewise subject to inspection, dipping, immunizing treatment, and similar safeguards. The results of the year's work show the far-reaching scope of this protection. No serious foreign livestock diseases gained entrance to the United States, though more than 116,000 animals and vast quantities of products associated with livestock were imported. Several hundred animals were refused entry because of diseased or parasitic condition.

Supervision over the movement of livestock in interstate commerce included about 75,000,000 cattle, sheep, and swine of which more than a million were dipped, immunized, or otherwise treated to prevent the spread of disease in areas to which the stock were shipped. More than 22,000 stock cars were cleaned and disinfected under Federal supervision. Similar treatment was given to about 13,500 cars used in the transportation of live poultry.

## DAIRY RESEARCH AND SERVICE

Results of 13 years of dairy-cattle breeding research and experimental work enable the department to declare that the most certain way to develop herds with an inheritance for uniformly high production is through the continuous use of "proved sires." A meritorious proved sire is one that has demonstrated through the production records of his daughters that he transmits only a high level of production. Since a bull can not be proved without an adequate number of records of his daughters, every effort is being made to increase facilities for obtaining

and compiling such records. One of the most practical ways is through dairy-herd improvement associations. With the records obtained through these associations, good bulls can be located.

Progressive breeders, agricultural colleges, and experiment stations are proving out a few bulls each year, through the records of their own herds or by lending promising young bulls to cooperators. The Bureau of Dairy Industry compiled this year enough production records on the daughters of bulls it had placed from its experimental herds with cooperators to afford evidence of the transmitting ability of seven Holstein sires. The daughters of six of these sires produced more milk and butterfat than their dams. The increases in milk production ranged from 203 to 2,120 pounds a year, and in butterfat production from 29 to 89 pounds a year. Only one of the seven had daughters which produced less than their dams. Records of eight Jersey sires showed that the daughters of seven of them averaged from 6 to 109 pounds more butterfat production than the dams of the daughters. On the other hand, the daughters of one sire had on an average a yearly production of 21 pounds of butterfat less than their dams. Results of the proved-sire method in herds at various field stations promise success from the application of this principle of breeding, whether the system used be outbreeding, line-breeding, or inbreeding.

#### Methods of Manufacturing By-Products

The department further developed improved methods of manufacturing cheese, ice cream, casein, and other by-products of the dairy industry and induced many commercial plants to adopt these methods. Half of the 36,000,000 pounds of Swiss cheese consumed annually in the United States is imported. Much of the domestic market is lost to our own dairy industry because American Swiss cheese is frequently not equal in quality to the imported article. It was demonstrated some years ago that the quality of Swiss cheese depends largely on the quality of the milk used in making it, and on the control of bacterial development in the cheese during its manufacture and ripening. The "culture method" of making Swiss cheese, which was developed by the department, enabled factories to produce a higher percentage of high-quality cheese.

Recent improvements in this method promise still better results. The earlier work demonstrated that there are at least two kinds of bacteria essential to proper ripening of this type of cheese and that the quality can usually be improved by adding them to the milk in pure cultures. It was afterward found that a third starter organism is also necessary. Later investigations indicated that the most advantageous rate of growth of these bacteria, their proper numerical relation at the different stages of manufacture and ripening, and the effect of one group on another.

It was found, for example, that certain bacteria are essential to proper eye and flavor development, but that too many cause "over-setting." The rate of growth of this culture was determined under different temperature conditions, and methods of starter making were standardized to introduce a uniform number of eye-forming bacteria into each cheese.

In the last year more than 3,000 packages of bacteria cultures were distributed to cheese factories. Because it is difficult to get these

liquid cultures to the factories at just the right time, the bureau developed a dry culture of the eye-forming bacteria. In this culture powder is standardized so that the required number of bacteria for a single cheese can be put in one package, and a supply sufficient for two or three weeks furnished each factory.

Many cheese factories in Ohio, New York, and Wisconsin, including a number which had never before used pure cultures, cooperated in a campaign to introduce the new method into commercial production. Factories using this method have been able to control manufacturing conditions and to produce more uniformly high-grade cheese. Domestic Swiss cheese made by the culture method won first honors last year at the Ohio State Fair, at the Dairy Industries Exposition, and at the Ohio Swiss Cheese Convention.

A method of ripening Cheddar-cheese curd in the container in which the cheese is marketed has been brought to a point at which it may be commercially utilized. The curd, pressed and cut to size, is placed in a specially constructed container wherein it ripens normally without molding. There is no loss of moisture, and hence no rind is formed. The cost of canning is not excessive, and is partly offset by the elimination of shrinkage and paraffining. The department helped factories in 13 States in the South and Middle West in making Cheddar cheese. In the South, where cheese making is a comparatively new industry, specialists recommended changes in methods. As a result, many factories are turning out No. 1 quality cheese. At one factory the sales value of cheese produced increased at the rate of \$4,000 a year.

A method of making uniformly high-quality cottage cheese was demonstrated. This product is known as the low-acid rennet type of cottage cheese. When made properly it has a rich creamy appearance, low acidity, good keeping qualities, and palatability. Cottage cheese is one of the most profitable outlets for by-product skim milk at dairy manufacturing plants, especially when it is of good quality.

### Increased Interest in Casein

Increased tariff protection on casein has renewed the interest of domestic creameries in this product, and manufacturers sought aid in applying the new grain-curd method. Five plants in the East and one in the West adopted the method, which enables them better to meet the requirements of the paper-coating industry, the largest consumer of casein. Many western plants manufacture lactic-acid casein. Accordingly, the department this year developed a modification of the grain-curd method which can be used by any casein factory without additional equipment. If all the casein heretofore imported were to be made in this country, it would afford an outlet for about a billion pounds of skim milk annually.

By planning and taking part in educational programs, by sponsoring students' judging contests, and by giving assistance in the training of dairy inspectors, the department aided cities and communities in improving the quality of their milk supplies. Many producers followed suggestions offered to improve the quality of their milk. The program was also forwarded through 4-H dairy clubs, by milk-improvement campaigns on an area basis, and through cooperation with the Federal Board of Vocational Education.

Demonstrations and lectures on improving the quality of milk were presented at the three Rosenwald negro extension schools at Orange-

burg, S. C., Prairie View, Tex., and at Nashville, Tenn., before 303 negro extension workers. A resurvey of an important milk-supply area in Maine, where a milk-quality campaign had been conducted the previous year, showed marked improvement in the quality of the milk coming into shipping stations; 57 per cent of the patrons delivered grade 1 milk after the educational campaign, whereas in the year previous the percentage had been only 39.8. Conferences between officers of the United States Public Health Service and department specialists resulted in an agreement to promulgate a milk ordinance embodying recommendations of the two organizations, to serve as a guide to States, municipalities, and communities, in the sanitary regulation of local milk supplies.

## PLANT INDUSTRY DEVELOPMENTS

Scientific discoveries and methods of cultivation that reduce costs of production on the farm have perhaps more value in periods of agricultural depression than at any other time. They are a sure means of increasing profits or, at any rate, of reducing losses. More efficient production need not be production in greater volume. Research that leads to increased yields per acre, to increased production of meat and milk per unit of feed consumed, or to improvements in the quality of farm products, though not the sole thing necessary to a profitable agriculture, is nevertheless indispensable.

Some notable contributions were made by the Bureau of Plant Industry to farm technology. This unit in the department has developed and promoted the use of better crop varieties, effected improvements in plant-disease control, and cooperated successfully with other agencies, public and private, in devising means for reducing spoilage in the transportation and storage of farm products.

### Improved Varieties of Cotton

Special attention was given to the production of better qualities of cotton. Plant-breeding studies and variety tests have demonstrated that improved varieties which produce longer and more uniform fibers outyield the shorter staple varieties in some localities. These results indicate that the shorter staple varieties in the United States, which produce cotton that comes into direct competition in foreign markets with the short-staple cotton of India and China, could be replaced by longer staple varieties throughout much of the Cotton Belt with little or no sacrifice in yields. Accordingly the department is conducting an educational campaign to encourage the planting of the improved varieties that plant science has developed. It is emphasizing the need for larger quantities of strong and uniform fibers in the automobile industry and in the production of airplanes, balloons, dirigibles, and parachutes. It is stressing also the increasing demand for fine cotton fabrics in clothing. As a first step for regional improvement in cotton production, the need of "single-variety" cotton communities is being urged. This recommendation rests on the necessity for adequate supplies of select seed year after year. Seed can not be maintained varietyally pure unless steps are taken to prevent its admixture with other varieties through cross-pollination in the field, as well as through the mixing of the seed in the cotton gin. A means of keeping the seed stock pure is to limit the production in each community to one variety.

### New Varieties of Vegetables

Exceptionally good results were obtained in tests of new tomato variety, Break O' Day, which was developed by the department. This tomato is both early and wilt resistant. Break O' Day seed was released in some quantity to a large number of seedsmen all over the country. Except under conditions of abnormally high temperature, it has given unusually good results. The new tomato was received with as much enthusiasm as was the Marglobe tomato some years ago. It is nearly as early as the Earliana variety. It has a large globular red fruit somewhat similar to that of the Marglobe and yields well over a long period. These characteristics, with its resistance to wilt, make it perhaps the most important variety of early tomato introduced since the Earliana.

The department also released for extensive cooperative tests a potato variety called the "Katahdin." This variety is the result of many years of critical hybridization and selection in different potato regions of the United States. It was selected particularly for its resistance to mild mosaic disease. Among other good qualities it has unusual uniformity in the size and shape of the tubers and in their cooking qualities. It is high yielding, comparing favorably in this respect with Rural New Yorker and Green Mountain. It originated in 1923 as the result of a cross made in potato-breeding work. After six years of preliminary testing in Maine it was tested on a small scale in 1930 by a number of growers in widely separated sections of the country and seemed well adapted to muck and peat soils, but not to regions that have summer droughts.

### Disease-Resistant Sugar Beets

Important results were recorded in the development of sugar beets resistant to the curly-top disease, which has caused heavy losses in the Western and Intermountain States. Disease-resistant strains have been developed by selection from commercial strains, and by crossing commercial beets with the wild beet of the Mediterranean area. Resistant-hybrid beets thus developed, when planted under moderately severe curly-top conditions, outyielded fields planted with commercial beet seed in the ratio of 3 to 1. They gave satisfactory yields, except under the most severe curly-top conditions. In one of the areas most seriously attacked by the curly-top disease a resistant strain provisionally called "Factory No. 1" outyielded a commercial strain by 4.3 tons of beets and 1,195 pounds of sugar per acre. In several places an increase of seed was obtained from this outstanding strain. Seed stocks from beets resistant to curly top are being increased as rapidly as possible, so that these improved strains may be introduced into commercial use.

Study of orchard-spraying problems resulted in slight, though important, modifications of technic in the handling of spraying materials under different conditions. Valuable information was obtained as to the handling of spray materials on different plant varieties and under different weather and cultural conditions. Considerable experimentation was done with new spraying materials. A public-service patent was taken out on a zinc-lime spray which is used to control bacterial leaf spot on peach foliage. This spray controls leaf spot without injury to the leaf; in fact it seems to stimulate the foliage. It was used with

arsenate of lead in two applications without doing any harm to the trees, and was also used without causing damage in combination with colloidal sulphur and arsenate of lead. Trees sprayed a dozen times, with the recommended strength of this spray, with two of the applications containing arsenate of lead, were not only uninjured but at the end of the season were the best-looking trees in the orchard in which the tests were made.

### Control of Plant Diseases

Investigations completed late in 1930 showed threatening developments in the white-pine blister rust situation. A rapid and devastating spread of this disease was discovered in the commercial areas of western white pine in northern Idaho and in adjacent portions of Washington and Montana. White-pine stands over extensive areas will suffer maximum damage by the rust during the next 10 or 15 years unless the disease is controlled. Control is possible only by the systematic eradication or suppression, in or near pine stands, of currant and gooseberry plants (*Ribes*). This is a more difficult and costly task in the Western than in the Eastern States. Many of the pine areas are difficult to reach with labor and supplies; wild currant and gooseberry bushes are abundant; control measures must be concentrated within a short period each season; and mixed ownership of large tracts of wild lands makes control operations difficult. Control is nevertheless possible, provided effective methods are systematically applied on an adequate scale.

Distinct progress has been made in the control of stem rust of wheat through barberry eradication since 1918, when this campaign was started. In the 5-year period 1916-1920 the average annual loss to wheat caused by this rust, aside from its effect on the quality of the grain, was estimated at 57,000,000 bushels. In the 5-year period 1926-1930 the loss attributed to this disease was estimated at less than 10,000,000 bushels. In the interim millions of barberry bushes were destroyed. All told, more than 18,000,000 barberry bushes susceptible to rust have been destroyed in the 13 States of Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Montana, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin, and Wyoming. Recent research has indicated that different strains of stem rust, when growing on the leaves of the common barberry, may actually cross and produce new strains which may infect grain bred for resistance to the parent rust forms. Hence the barberry bush, besides carrying considerable quantities of stem rust over the winter in the spring-wheat areas, may also serve as a special breeding ground for new and dangerous forms of the disease.

### Refrigeration of Perishables

For a number of years experimental studies have been made on the reaction of perishable fruits and vegetables to the temperature and other environmental conditions encountered during transportation and storage. The primary object has been to improve existing handling practices with a view to increasing the shipping radius and lengthening the period during which the products may be distributed to consumers in sound, wholesome, and attractive condition, with minimum risk of deterioration and at minimum cost.

emphasized. Adequate steps, however, were not taken. Effective controls are possible chiefly against the "egg beds" and against the newly hatched hoppers. After the insects have reached practically full growth and are becoming winged, control becomes difficult or impracticable. The eggs can be destroyed by cultivating areas where the grasshoppers have collected for oviposition. The young insects can be controlled even more effectively by the use of poisoned bran baits as they emerge from egg-laying areas, or during their migration to small-grain and forage fields and later to corn.

The damage, though exaggerated in many reports, was so serious in its worst phases as to arouse general interest, and many demands were received for Federal aid for the poisoning of these hungry hordes of insects which threatened the destruction of thousands of acres of crops in the Great Plains area of the west. Unfortunately the department had no funds available for the purchase of poisons or for labor. All that could be done was to cooperate with State and local agencies in directing practicable control measures.

Abundance of hoppers and prospective damage were indicated early in May when hatching began over the areas of egg deposition, in some of which the eggs had been placed in the sod at the rate of 10,000 to the square foot. Over most of the area, before any important action was taken by the States concerned, the most effective period for control had passed. Some benefit would still have been possible had an adequate supply of poisoned bait, and means for its application, been available. In South Dakota, where operations were begun early in June, the commercial bait mixture used—24 carloads of which were distributed—contained poison at only half the required rate. The use of this bait was naturally disappointing. Toward the end of June a much better bait, prepared commercially under the proper formula, became available and gave excellent results. By this time, however, the movement of grasshoppers from small-grain and forage crops was well under way and many fields of corn had been destroyed. The distribution of poisoned bait at this time killed the insects that fed on it, but the enormous number of grasshoppers that continued to move into corn made it impossible to save the crops. It soon became evident that further large-scale poisoning for the season was a wasted effort, and a general determination was reached to conserve the funds made available by the States for use in the destruction of eggs in the winter of 1931-32, and particularly for the baiting of the young grasshoppers of next year's brood.

The outlook for 1932 can not now be definitely indicated. The situation may be more or less safeguarded by winter and spring conditions adverse to the insects. It seems desirable, however, to make preparations to prevent a repetition of this year's experience. This department will help to survey localities in which egg masses are likely to be deposited in large numbers, and to supervise the destruction of grasshopper eggs during the winter by cultivation. It will cooperate also in the more important work of poisoning the young hoppers early next season.

#### Mexican Bean Beetle

The Mexican bean beetle has now spread from the Southwestern States, where it has long been established, through the Southern, Central, and Eastern States and as far north as Canada, and continues to be the most important pest of the bean crop. Public interest in this

insect is greatly accentuated by the fact that it has made the kitchen-garden culture of beans as a table vegetable very uncertain. While the control of the bean beetle in commercial plantings for the market or for canning is readily obtained by three or four applications of magnesium arsenate, applied with adequate machinery and at the proper time as a spray, the similar control of the pest on garden crops is much more difficult. Not only is it difficult to have such spraying done as efficiently as to method and time, but more treatments are needed, because in such garden cultures the picking is extended over the longest possible period, whereas in commercial cultures it concerns usually only a few pickings over a much shorter period. Control is also possible with pyrethrum extracts. These materials are particularly useful on small garden plantings when it is necessary to apply a remedy after the crop has reached the bearing stage, since pyrethrum is nonpoisonous to man in the dilutions used to control the beetle.

The effect on the bean beetle of the long drought and high temperatures of 1930 was to reduce the winter carry-over of this pest. Damage from it during the current season was much reduced. No permanent natural control of the bean beetle by parasites has been developed in this country. Attempts have been made to introduce a parasite from Mexico, but it has proved difficult to carry the insect over the winter. In the winter of 1930-31, however, a large number of parasites were bred in a greenhouse and liberated. The establishment of this beneficial insect should help to reduce the bean-beetle menace.

### Japanese Beetle

The Japanese beetle is becoming less abundant in the sections reached first in its spread from where it was introduced in New Jersey. This is partly a result of natural controls—diseases and parasitic insects—such as normally come, although often slowly, in the case of most introduced pests. Some of the decrease, however, may be credited to the importation from Asia of foreign parasites of the beetle. This work has established considerable numbers of certain enemies of the beetle and its grub in the invaded area.

Artificial control, through baits and insecticides, is becoming more effective. The beetle, however, is very resistant to poisons, and the grubs must be reached by difficult soil treatments. A new phase of control has been developed this year in the application of a dust to sweet corn at the beginning of the "silking" stage. This protects the silk from attacks of the beetle, and thus safeguards the growing crop. Another recent development has been the successful application of acid-lead arsenate to soil in nursery plantings and to lawns for the destruction of the grubs—a required condition in the shipment of nursery stock under the Japanese-beetle quarantine.

### Mediterranean Fruit Fly

Research work on the Mediterranean fruit fly has been concluded in Florida but is being pushed in Hawaii. In Florida investigations initiated in the eradication effort of 1929 were completed. The results will help in the control of the pest should it again get a foothold in the United States. Important studies deal with the action, harmful or otherwise, of arsenic, copper, and other bait sprays on citrus and other fruit trees, and with the cultivated and wild fruits of Florida which are

possible hosts of the fly. A study has been completed also of certain native fruit flies which occur in Florida. This assembles much information which will facilitate the determination of any suspected maggots in fruit, and their easy separation from the dreaded Mediterranean species. Studies of the insect itself and its control in relation to its various host fruits have been conducted in Hawaii since the end of 1929. The University of Hawaii built specially designed laboratories and offices for the department's workers, and set aside land for experimental plantings. Closely related is a study of the native fruit flies of Mexico, in which the Mexican Department of Agriculture cooperated.

### A New Pest of Stored Tobacco

A serious type of insect injury to stored leaf tobacco developed during the year. It was caused by the larvae of a cosmopolitan moth, *Ephestia elutella*, which hitherto has not been at all abundant or even destructive in the United States, and in this and other countries has confined itself largely to stored vegetable foods. In such associations it has been several times reported in the United States. Early in August, 1930, it was found to be heavily infesting stored leaf tobacco in an isolated area in the bright-tobacco belt. Thousands of moths were flying about in the warehouses, and the feeding of the larvae had extended 3 or 4 inches into the tobacco as stored in hogsheds.

Following the report of this injury, a thorough investigation was made which indicated that the infestation was confined to five warehouses. Some 31,000,000 pounds of leaf tobacco valued at \$10,500,000 were involved, infestation being heaviest in the more valuable grades. The warehouses containing this tobacco were given drastic fumigation in August of last year and a second and even heavier fumigation in June of this year. These fumigations largely eliminated the pest. The moth must, however, be reckoned with as a future potential pest of leaf tobacco.

### Arsenic-Residue Problem

In the last 50 years various arsenical insecticides have become standard for the control of many fruit and vegetable pests. A result is the arsenic-residue problem, the urgency of which increases with the wider use of arsenicals, and with the enforcement of restrictions as to arsenic tolerance in products both for domestic use and for export. In fruits this situation is met by washing them either in diluted acid or alkali, but the problem can not be considered solved until a remedy is found that will control the codling moth, the Mexican bean beetle, and similar pests, and will not leave an objectionable residue.

In the case of the codling moth, hope is now seen in certain fluorine compounds. Two—barium fluosilicate and cryolite—gave satisfactory results in field tests conducted in the Pacific Northwest in 1930 and again this year. These compounds and others have proved inadequate for the control of the codling moth in humid sections, but the results obtained in comparatively dry regions suggest the possibility of adapting them to other climates. Another alternative for arsenicals is the use of a mixture of nicotine sulphate in a dilute white-oil emulsion—a combination which has given fairly good results when used against the apple worm in the Northwest, but has again been less satisfactory elsewhere.

### Black Fly

This department and the Cuban Department of Agriculture completed this year a cooperative project looking to the control of the black fly, a pest attacking the leaves of trees and not the fruit. It is the most important enemy of citrus trees in Cuba and other islands of the West Indies and in Central America. The risk to the Florida citrus crop is obvious. The original home of the black fly was believed to be in southeastern Asia, and it was known that natural parasites of this pest occurred there which, if imported, might accomplish effective control. The Cuban authorities offered to make this attempt and to assume the operating costs of the undertaking if the department would supply technical personnel. This was done with notable success. Several different types of minute wasp parasites were introduced. One of these, *Eretmocerus serius*, multiplied to an extent that permitted liberations throughout Cuba, and also the establishment of colonies in the Canal Zone and Haiti. For Cuba the black-fly menace is now looked upon as fully controlled. All groves in which colonies of the parasites were established prior to October, 1930, are now commercially free from the fly. A number of coccinellid beetles were also introduced. One of these has proved able to do effective work, though not with the certainty of the parasite *Eretmocerus serius*. A sympathetic attitude toward the collection and importation of insect parasites has developed throughout the world. The United States has benefited, and has extended benefits to other countries. For example, the department this year, in response to a request from the Government of Spain, transmitted to that country a considerable shipment of an important parasite of the Mediterranean fruit fly, long since established in Hawaii but not occurring in Spain. This shipment reached its destination and is being successfully propagated there.

### PLANT QUARANTINES

The work of the department in the eradication of the Mediterranean fruit fly in Florida was so successful that on November 15, 1930, all the restrictions on the movement of Florida products on account of this insect were removed. The last infestation was found in a doorway in St. Augustine, Fla., on July 25, 1930. Suspension of field inspection was necessitated by lack of funds from March 27, 1930, to June 13, 1930. Funds were made available on the latter date, and inspection was resumed. This work was done by from 220 to 750 inspectors until March 31, 1931, when it was discontinued. The quarantine maintained in Florida from May 1, 1929, to November 15, 1930, prevented the spread of the insect to other States. Moreover, it assured open markets for Florida's products. States receiving these products accepted them with reasonable certainty that their fruit and vegetable industries were not jeopardized.

Similar results attended the enforcement of other quarantines by the department. A notable illustration is the Japanese-beetle quarantine. Products within the infested area are inspected by the department and certificates are issued which, so far as Japanese beetle is concerned, carry the plants to their destination and insure their acceptance. Experiments conducted during the year made it possible to modify the Japanese-beetle quarantine restrictions on products moving out of the

infested area in such a way as to permit greater freedom in shipping them. Nurserymen and others affected cooperated willingly with the department in endeavoring to retard the spread of this insect.

### Gipsy-Moth Control Work

Quarantine and eradication work accomplished the apparent extermination of the gipsy moth in a large area in the State of New Jersey. In 1921 more than three million egg clusters were found in an area of approximately 400 square miles. Eradication measures were undertaken in cooperation with the State Department of Agriculture of New Jersey. No gipsy moth, in any stage, has been found in this area since May, 1929.

The gipsy moth has been abundant in New England since 1889. For years its westward spread was gradual but steady. Eight years ago the department, with the cooperation of the New England States and the State of New York, established a barrier zone about 30 miles wide extending from the Canadian line to Long Island Sound. This zone is in the eastern part of New York State and the western parts of Massachusetts, Connecticut, and Vermont. Inspections are made by the department and by the State of New York, and any infestations found are exterminated. So far as is known no infestation has become established west of the barrier zone.

### Pink Bollworm of Cotton

The pink bollworm of cotton, which is established only in comparatively small areas in the southwestern section of the United States, constitutes a serious threat. Eradication is undertaken where it seems practicable, and efforts are made in all infested areas toward preventing the spread of the pest to the main cotton-producing regions. The first necessity is the determination of the infested areas. Remarkable progress has been made in this work through the development of machines which separate any pink bollworms which may be present in gin trash. Each machine does the work of many men, and does it better. These machines, supplemented by the gathering and inspection at a central point of representative samples of cotton bolls throughout the Cotton Belt, made possible in the 1930-31 season, for the first time, a fairly comprehensive analysis of insect conditions in the main Cotton Belt. No pink bollworm infestation was discovered in the main cotton-growing areas.

Tests conducted in the fumigation and compression of baled cotton lint permitted the removal of certain fumigation requirements in areas known to be lightly infested by the pink bollworm. This modification of the quarantine saved many thousands of dollars to cotton producers, without increasing the risk of spreading the insect to areas not now infested.

Maintenance of the European corn-borer quarantine prevented this insect from reaching the main corn-producing regions of the United States and afforded more time for perfecting control operations.

Inspection forces at the ports of entry in the United States have been substantially increased. This not only gives better protection against the importation of injurious pests but permits the entry, under proper supervision, of larger numbers of plants which can safely be admitted.

## CHEMISTRY AND SOIL RESEARCH

Investigations in the Bureau of Chemistry and Soils brought some significant results in the protection of foods and other farm products against various destructive influences, in the utilization of farm by-products, in soil conservation, and in the adaptation of fertilizers to particular soil requirements. Further progress was made in the development of important new insecticides. Specialists in the bureau cooperated with farmers and manufacturers in developing practical applications for recent chemical discoveries, and also in experiments undertaken to test, on a commercial scale, some of the more promising laboratory results.

Losses from the spontaneous heating of hay are not confined to the burning of barns and other farm property. Damage of this sort, though estimated to exceed \$20,000,000 annually, is multiplied many times by the loss that results from the decrease in weight and nutritive value of hay which occurs during spontaneous heating. This country's hay crop has an estimated average annual value of about \$1,300,000,000. At least a tenth of our harvested grass crop is destroyed by spontaneous heating. Experiments conducted with experimental barns and other equipment have thrown new light on the spontaneous heating and combustion of hay. It is now believed that hay bacteria, in the parts of the haymow from which air is excluded, produce unstable compounds that undergo rapid oxidation when air is accidentally admitted with a development of heat rapid enough under certain conditions to set fire to the hay. If this proves to be the case, an important step will have been taken toward the discovery of practical means of reducing losses from spontaneous heating.

Experiments conducted over a period of eight years resulted recently in proof that leather absorbs sulphurous and sulphuric acids from the gaseous pollutions of the atmosphere. This is one cause and perhaps the primary cause of the relatively rapid rotting and short life of many leather goods, such as harnesses, bookbindings, upholstery, and bags. Paper also, experiments showed, may be damaged by the absorption of gases from the air. Accordingly, research is being directed toward the discovery of types of leather and paper that can withstand this deteriorating influence. Efforts are being made also to develop, for leather, protective dressings or treatments.

## Fumigants and Insecticides

In experiments with new fumigants and insecticides extremely promising results were recorded. Ethylene oxide, a fumigant discovered by the department in 1927, is made more effective when mixed with carbon dioxide, and also is free from fire or explosion hazard. This fumigant is used in the fumigation of grain, foodstuffs, and other commodities. Following a hearing before the examiner of interferences of the United States Patent Office, in which the priority of the department in the use of ethylene oxide as a fumigant was upheld against the claims of certain German inventors, a public-service patent for the discovery was issued to two members of the department. Thus the fumigant was made available to all American citizens, and its wide use encouraged.

The department recently developed a synthetic organic compound which is more toxic than nicotine when sprayed upon aphids. Nicotine, one of the most valuable insecticides used by orchardists, truck-

crop growers, nurserymen, and florists, is not available in sufficient supply. The new synthetic substitute is called neonicotine. One of the largest manufacturers of coal-tar products is making an insecticide which contains neonicotine as its active ingredient. A common Russian weed, *Abasis aphylla*, was recently found to contain as much as 2 per cent neonicotine and related alkaloids. Efforts are being made to introduce the cultivation of this plant into the United States.

### Utilization of By-Products

Chemical research is steadily accumulating knowledge useful in the utilization of agricultural by-products. Sugarcane bagasse, a material formerly produced in amounts smaller than those required by the insulation-board industry, is now, as a result of the introduction of mosaic-resistant varieties of sugarcane in Louisiana, produced in excess of the demand. Studies showed methods whereby bagasse may be made a source of cellulose equal to any now available, except that manufactured from cotton linters. Cellulose from bagasse, it is hoped will find an application in the rayon and the nitrocellulose industries. Several new compounds were obtained this year from lignin, a substance present in the straw, stalks, hulls, and other cellular residues of leading crops. Some of these new compounds seem likely to be useful in the pharmaceutical and chemical industries. Lignin has possibilities also in the production of synthetic resins, dyestuffs, and tanning materials.

Means have been developed for the production of fine-quality starch from sweetpotatoes of any variety, regardless of whether or not they have been stored. This discovery has promising economic possibilities, because the percentage of culls in the sweetpotato crop is large. At present cull sweetpotatoes are either wasted or inadequately utilized. In a vegetable crop second in importance only to the potato crop, a cull problem of this magnitude obviously demands a remedy. From 10 to 20 per cent of the sweetpotato crop consists of oversize or undersize sweetpotatoes that must be classed as culls owing to the stringency of market grades. Sweetpotato starch has properties generally similar to those of potato starch, a commodity imported into this country in large amounts.

Industrial uses may be found for the waxy coating of apples. Research recently showed that this coating consists principally of a paraffin hydrocarbon, a solid alcohol, and a hydroxy acid known as ursolic acid. A commercial research laboratory experimented with these materials, and reported that they might be commercially valuable, particularly in retarding the drying and in improving the gloss and water resistance of cellulose lacquers. Crude ursolic acid may find a commercial application as a waterproofing material. The sodium salt of ursolic acid acts as an emulsifier of water in oils. The paraffin hydrocarbon has properties that suggest its use in paint and varnish removers. It has been estimated that nearly half a million pounds of each of the principal constituents above mentioned could be recovered from the residues obtained in the canning of apples, in cider and vinegar making, and in the dehydration of apples. Many commercial firms are seeking industrial uses for these apple-surface compounds.

Research in the department and in the State experiment stations has shown that copper is an essential requirement of plants and animals. Traces of copper added to certain unproductive soils lacking copper

make these soils productive. Anemia in man and in animals may often be corrected by the use of foods containing copper. Experiment station workers discovered that the so-called salt sickness of cattle in certain parts of Florida results from a deficiency of copper in their forage and other foods.

### Progress of Soil Surveys

In the last fiscal year the department completed a detailed mapping and description of 28,530 square miles of soils in 30 States and in Porto Rico and the Virgin Islands. In addition it made reconnaissance surveys of 10,014 square miles in Minnesota, Montana, Oklahoma, and Vermont. This work brought the entire area mapped and described since the soil survey was begun to 1,449,792 square miles, or 927,866,880 acres. Knowledge gained in soil surveys is the basis of some important recent agricultural developments. In Georgia, for example, soil surveys located and ascertained the quality of certain soil types adapted to tobacco. Trials were made, the tobacco crops succeeded, and tobacco growing developed within a few years from a comparatively unimportant position to one in which it stands second in value among the crops produced in Georgia. By other soil surveys certain soils in the piedmont section of Georgia were found suited to alfalfa, and this crop is now spreading there rapidly.

Soil studies often indicate profitable fertilizer practice. A good example is the growing practice of applying small amounts of phosphatic fertilizer to sugar beets. This practice, the economy of which was determined by soil specialists in the Bureau of Chemistry and Soils, increases yields about 3 tons of sugar beets per acre, and is widely used throughout the western beet-growing territory. This pioneer work has increased the value of the sugar-beet crop in the western sugar-beet area by \$4,000,000 or \$5,000,000 annually. Beneficial results have likewise followed fertilizer experiments conducted in the principal sugarcane areas of Louisiana. In an important strawberry-growing district of North Carolina, growers formerly used about 1,500 pounds per acre of a well-balanced fertilizer annually. They put this down in two applications, one in late summer after the berries were harvested, and the second in the following winter. Tests showed that yields may be greatly increased by applying all the fertilizer in one application late in the summer or early in the fall. This simple change, in various tests and eventually in commercial practice, produced from 400 to 500 quarts of berries per acre more than the split applications previously used. Furthermore, the berries matured earlier. Strawberry growers in the Chadburn district of North Carolina, by using the new method of applying fertilizer, received this season about \$75 an acre more than they would have received had they used the old method.

### Fertilizer Studies Productive

Recent experiments have shown that concentrated fertilizers are often more effective when, in addition to nitrogen, phosphorus, and potash, they contain some or all of the less common essential elements for plant growth. These include calcium, magnesium, manganese, copper, zinc, nickel, and boron. On some soils, synthetic and concentrated fertilizers of the sort commonly sold have a low efficiency, which is too marked to be the result of improper distribution or placement of the fertilizer. The trouble may be a shortage of some rare essential chemical. Manganese was found to be deficient in soils in a large area

in Florida, and in a group of soils on the Atlantic seaboard further north. By supplying this essential element, growers have netted good returns from land that was formerly unprofitable. Extensive areas formerly barren now produce a variety of truck crops for the northern markets.

Chemical research under way has an important bearing on the fertilizer industry. The farmers of the United States in recent years have spent about \$250,000,000 annually for commercial fertilizer. So that they may get more value for this expenditure, the department conducts investigations to learn how nitrogen, phosphoric acid, potash, and other materials may be more effectively converted into fertilizers; how methods of applying fertilizers may be improved; and how sources of fertilizer materials may be developed. This last-mentioned item is particularly important because the United States is still dependent on foreign sources for no less than 80 per cent of the potash used in agriculture. American potash production is increasing, however, and now supplies annually about 100,000 tons of fertilizer salts. An important potash mine, producing water-soluble potash salt, was recently opened in New Mexico. Various potash materials exist in great quantities in various parts of the United States, and the department is studying how these may be commercially developed. Recently published results of research on blast-furnace problems are expected to have a favorable influence on the production of potash and phosphoric acid fertilizer in the United States.

#### Ammonia in Superphosphates

One of the most interesting recent developments in fertilizer manufacture is the direct use of ammonia in the treatment of superphosphates used in the manufacture of mixed fertilizers. This has certain advantages combined with disadvantages. This ammonia-treated superphosphate in fertilizer mixtures improves their mechanical condition, prevents rotting of the bags, and gives a more highly concentrated fertilizer. On the other hand, the availability of the phosphoric acid is reduced. Accordingly, the proportion of free ammonia which can be used economically in the manufacture of fertilizer mixtures is limited to about one-fourth or one-third of the maximum that could be included. Studies recently showed, however, that the use of free ammonia in fertilizer manufacture should not reduce the availability of the phosphoric acid as much as was supposed. Experiments made in this connection were confirmed at agricultural experiment stations throughout the country. Interest in this problem was so great that more than 25 research institutions participated in the tests, which showed that it should be possible to double the quantity of free ammonia used in manufacturing fertilizer mixtures without appreciably lowering the value of the phosphoric acid. Accordingly, State officials are taking steps which will permit an increase of about 100 per cent in the use of free ammonia in fertilizer manufacture. This will mean an increase of about 80,000 tons per annum in the use of synthetic ammonia. This quantity is worth at wholesale about \$8,000,000. The direct use of ammonia in fertilizer mixtures has the added advantage that it improves their drillability, and promotes a more uniform distribution in the field. Tests at State experiment stations have shown that a uniform distribution of fertilizer gives at least a 10 per cent saving.

### Soil-Erosion Problems

Erosion, which annually removes fully 500,000,000 tons of soil from the farms of the United States, is the subject of extensive investigations. Two stations for the experimental study of soil erosion were established during the last year in the States of Washington and Iowa. Six similar stations had been previously set up. These are located in Oklahoma, Kansas, Mississippi, Missouri, Texas, and North Carolina. The new stations are in the Washington-Oregon-Idaho wheat belt and the rich loessial Corn Belt soil area of the Missouri River Valley, in both of which regions erosion is a serious problem. Funds for an erosion-control and moisture-conservation program were appropriated by Congress in 1930.

It was demonstrated during the last year that on certain moderately steep slopes, some soil types erode so rapidly that it seems impossible to utilize the land for clean-tilled crops except by strip farming, with terracing and the use of soil-saving crop rotations as well. These methods, however, promise to be very effective. Subsoiling in alternate strips is also under experimentation. Terracing proved valuable in the rolling parts of the red plains of Oklahoma, not only in slowing down erosion but in partly rehabilitating eroded land. At the erosion station in Missouri, a field badly damaged by sheet erosion and gullying was reclaimed by constructing small dams in the gullies. These dams were made with old fertilizer sacks filled with soil and bluegrass roots. The bluegrass roots grew through the bags, took hold of the ground, and established "living" dams, which quickly silted in from above with the first rains. Between the dams the gullies were seeded to wheat, which grew well. This experiment, because of its practicability and cheapness, attracted wide attention. At the Oklahoma station it was found that cotton from eroded land has less strength than cotton from uneroded land, and that the seed contains considerably less oil. The average depth of the topsoil of our uplands is only about 9 inches. In some localities this is being washed off at the rate of 1 inch in from four to eight years. In losing this layer, which contains far more plant food than the unweathered raw subsoil, the farmer is losing his principal capital. Better protection of erosive cultivated areas is a national necessity.

A representative of the department, with the cooperation of a representative of the Kansas Agricultural Experiment Station, has built a cultivator which promises to prove effective as a means of conserving soil and water in that region, and possibly in other regions, by causing more of the rainfall to sink into the ground, thus reducing erosion. This machine can be used both as a cultivator for row crops and as a surface-tillage implement for fallow. It digs approximately 10,000 holes per acre, each hole having a capacity for holding 2 to 3 gallons of rain water. Although the holes collectively impound a large amount of water, their greatest value comes from the fact that the water is held still and given a chance to soak into the ground.

### FORESTRY

The forestry work of the department supplements its work for agriculture. Agriculture and forestry apply the same basic sciences to the same basic end of land use. Which is preferable in any given case de-

pendes partly upon the physical factors that determine crop productive-ness, and partly upon economic and social requirements. Continued overproduction of agricultural products has made conspicuous a need to find other ways of making serviceable a vast aggregate of potentially cultivable land. There is also the vast acreage of forest land which has no agricultural possibilities at all. The department seeks to find out how to make forestry a good form of land use and how to utilize the products of the forest to best advantage; it seeks to bring about the application of suitable forestry practices; it administers the national-forest enterprise; and it cooperates with the States for the promotion of forestry under the terms of the Weeks, Clarke-McNary, and amendatory laws.

### Forest Improvements

Congress increased the funds for national-forest improvements from \$645,000 for 1930 to \$2,500,000 for 1931. Nearly all of this was for improvements to facilitate fire control, chiefly roads and trails. Additional road and trail funds provided elsewhere in the agricultural appropriation act, in the second deficiency act, 1930, and under the continuing appropriation of 10 per cent of the national-forest receipts exceeded by \$3,545,168 the corresponding amounts for the previous year. A further increase of \$6,354,800 was made in the 1931 appropriations under legislation providing for emergency constructions of various kinds, chiefly road building, and for emergency work in the control of insect infestation. On the other hand, various cuts in appropriations for national-forest purposes other than improvements, and for fire fighting, reduced by more than \$2,000,000 the funds thus made available.

All told, Congress appropriated for national-forest improvements nearly \$20,500,000. In part this was inspired by the policy of the administration and of Congress to increase employment. What was accomplished by the Forest Service in this field is related elsewhere in the present report. The Forest Service happened to be peculiarly prepared to expand construction work along needed and approved lines. It had a carefully worked out long-time improvement program for the national forests, and its organization provided the necessary leadership for immediately inaugurating a large number of local projects.

### Fire Protection

To give the forests efficient and economical protection and to bring about full use of their resources necessitates a large investment in roads and trails, lookout houses, cabins and other administrative structures, telephone lines, and many other improvements. As protection is facilitated fire losses are reduced and the heavy costs of suppressing great fires are less frequently entailed. To complete the entire improvement program for the national forests will require a further large outlay; progress must necessarily be adjusted to the financial exigencies of the Government. That the improvements already constructed are proving a sound investment the results obtained in protecting the forests during the severe fire season of 1930 and the current year clearly show. A major advance in solving the extremely difficult problem of fire control in the West can with some confidence be claimed.

The heart of the problem is how to stop fires in bad years. Such years occur irregularly. They are the result of unfavorable weather—abnormal heat, violent winds, very low atmospheric humidity, and electric storms with heavily “bunched” lightning. Since 1905 the bad years have been 1910, 1919, 1924, 1926, 1929, 1930, and 1931. Recent years have witnessed a cumulative shortage of precipitation that has reduced the supply of ground water and affected vegetation. In most respects 1930 was as bad a year as almost any of its predecessors. But while the area burned over in the preceding five years averaged 0.29 per cent of the entire national-forest area annually, the 1930 fires were held to 0.11 per cent of the entire area.

In 1929 nearly 800,000 acres were burned over; in 1930 less than 140,000 acres. Yet the 8,388 fires in 1930 exceeded by 12.6 per cent the number of those in 1929.

In 1930 the fire-fighting expenditures, exclusive of the time of forest officers, were less than \$1,200,000, as against more than \$3,200,000 in 1929. The fire damage in 1930 was estimated at less than \$350,000; in 1929, at nearly \$4,340,000. The difference was due partly to better preparedness. This was made possible by the larger provision of funds for improvement construction and for fire-fighting equipment. The whole work of suppression has been raised to a new level of efficiency and speed, so that fewer fires attain large size and those which do are held within narrower limits and are much more quickly brought under control.

#### Extension and Consolidation of National Forests

Sound principles of land economy and public interest seem to dictate both the extension and better consolidation of the national forests by (1) the addition thereto of the remaining public lands most valuable for timber production and stream-flow protection, and (2) the acquisition of privately owned lands within national forests by exchanges therefor of national-forest lands or stumpage in the Western States and by purchase under the Weeks and Clarke-McNary laws in the Eastern States.

A recent study shows that of the remaining unreserved and unappropriated public lands in the Western States some 19,000,000 acres are of such importance for timber production or stream-flow protection as to suggest that the addition to the national forests of a considerable part thereof would be in the public interest.

More than half of the State and private lands within national-forest boundaries in the Western States and several million acres of similar lands outside but contiguous to the national forests are integral with the public properties. The acquisition of such lands through exchanges to the possible extent of some 15,000,000 acres or more demands eventual consideration. Many opportunities for land exchanges advantageous to the United States are now available, but can be approved only where they do not involve any appreciable reduction in timber-sale receipts or the proportion thereof payable to the counties.

To date Congress has enacted a total of 66 laws authorizing the Secretary of Agriculture, with the concurrence of the Secretary of the Interior, to exchange national-forest lands or stumpage for privately owned lands within or contiguous to national forests where such ex-

changes will consolidate and improve the public properties. The net result of these 66 acts, as of December 31, 1930, has been the consummation of 691 exchange cases whereby the United States has acquired 1,005,527 acres of land valued at \$4,119,155 in exchange for 291,697 acres of national-forest land valued at \$1,538,278 and 768,563,000 board feet of national-forest stumpage valued at \$2,096,789. Besides the net gain of 713,830 acres in national-forest area, the volume of stumpage on the acquired lands is greater than that surrendered. During the year, 157 new land-exchange cases were approved and submitted to the Secretary of the Interior. These contemplate the conveyance to the United States of 304,906 acres of privately owned lands in exchange for 30,890 acres of national-forest land and \$570,844 worth of national-forest stumpage.

East of the Great Plains the national-forest lands now comprise 2,482,746 acres reserved from the public lands and 4,675,020 acres acquired by or in process of purchase under the Weeks and Clarke-McNary laws. The program approved by the National Forest Reservation Commission contemplates the ultimate acquisition of approximately 9,000,000 acres more, or eventual Federal ownership of approximately 16,000,000 acres, which would be about 4.3 per cent of the estimated forest-land area east of the one-hundredth meridian. By the act of March 3, 1931, the purchase of not to exceed 50,000 acres for addition to the Luquillo Forest in Porto Rico was authorized by Congress.

During the year nearly 550,000 acres were approved for purchase at a cost of approximately \$1,944,000. The rate of progress is determined by the yearly appropriation, which since 1929 has provided \$2,000,000 annually. In accordance with the administration program for curtailment of expenditures the disbursement from the 1932 appropriation will be limited to \$1,700,000.

The transfers of land from national forests to national parks made during the year are instances of a long series of proposals of such transfers which have been almost continuous for 20 years. A number of the western national parks have been created from portions of national forests, and several others are surrounded by national forests. Necessarily many question as to the best boundary adjustments have arisen. Often the proposals have originated in local desires for anticipated local advantages. Each accomplished transfer has required a specific law. It should not be difficult to formulate definite standards of quality and function that will afford clear-cut differentiation between the lands that will serve their highest public usefulness as national parks and the lands more suitable for national forests. The problem in every case is one of social, industrial, and political economy readily determinable by systematic analysis of major factors in the light of established principles of public policy. Local pressure for one or the other form of administration ought not to control the decision, as against the large public interest. The efforts of the two services charged with the responsibility for administering these two Federal undertakings to develop a common viewpoint on the principles and purposes that should mark off their respective fields and a procedure for resolving doubtful questions as to the areas best suited to one or the other form of administration, would be much more effective if a definite public policy were determined and established.

### Forest Receipts

The receipts from the national forests totaled \$4,993,320.08, a decrease of \$1,758,233.14, due to decreased receipts from timber, which were only slightly more than \$2,600,000. Grazing receipts, on the other hand, of nearly \$2,000,000, were a little greater than those in 1930, as were also the receipts from miscellaneous land uses; these came to more than \$400,000. Timber-sale receipts reflected chiefly the nation-wide decrease in lumber production.

Overproduction and market demoralization have been chronic in the lumber industry for years. The national-forest timber-sale policy has therefore withheld offerings of timber that would initiate new manufacturing enterprises except to utilize overmature stands, to check insect infection or disease epidemics, to salvage dead or dying timber, or to assist dependent local communities. On the other hand, where going mills needed new timber national-forest stumpage has been made available, to promote industrial and community stability. By direction of the President, the policy of restriction of national-forest timber offerings was given redefinition and added emphasis near the close of the year. During the present economic situation sales in excess of \$500 will be made only to supply the needs of existing sawmills dependent for their new material upon the national forests and unable to obtain it elsewhere, to furnish domestic paper mills with raw material needed to supply the domestic market with newsprint and other wood-pulp products, and to dispose of windthrown, insect-infested, and fire-damaged or fire-killed timber.

### Cooperation with States in Forestry

Cooperation with States for the promotion of forestry is provided for under the Weeks, Clarke-McNary, and amendatory laws on a scale set by the annual appropriations. The forms of cooperation are: (1) Maintaining organized systems of protection against forest fires; (2) producing and distributing to farmers forest-planting stock; and (3) farm-forestry extension. In 1931, 45 States and 2 Territories cooperated in at least one form, 20 States in all three forms, and 19 in two. To the cost of protection the cooperating States contributed \$4,000,000, and to planting-stock production and distribution nearly \$250,000. The ratio of State to Federal expenditures for the first purpose was 3 to 1, and for the second, also 3 to 1. In addition private agencies contributed to the protection funds \$1,100,000. The area protected, 228,000,000 acres, was about 4,000,000 acres greater than that protected the previous year. Since 1925 there has been an increase of 50,000,000 acres, and an enormous upbuilding of State forestry activities, legislation, and general public interest.

The laws authorizing the three forms of cooperation limit Federal participation in each State to one-half the total outlay in that State, for the same purpose. With appropriations that do not permit a Federal matching of State expenditures, the department seeks to apportion the amount available along the most equitable and serviceable lines. The Federal participation varied from an even division of the cost in 10 States to a less than one-seventh share in 4 States. For all States combined the Federal funds made up 25 per cent of the total expenditures, State funds 60 per cent, and private funds 15 per cent.

When the Clarke-McNary law was passed, it was commonly held that for private forest land the owners should meet half the cost of protection, with the States and the Federal Government dividing equally the other half. It has become plain, however, that a large portion of the private forest land in the country is not regarded by its owners as having sufficient promise for permanent timber growing to be worth protecting at their own cost after the merchantable stand has been removed. The prospect is that much cut-over land will be abandoned in preference to paying taxes on it. The necessity of meeting protection costs, where this is required, makes abandonment the more probable.

### Research in Forestry

The use of private land, whether now forested or cleared, for timber growing, hinges on the returns that can be looked for. Timberland owners will not make expenditures to keep their lands productive without a reasonable prospect that the investment of capital involved will turn out well. It is common to assume that timber raising is bound to pay. The lumber industry, on the other hand, is profoundly discouraged regarding the future. Enough is not yet known about costs, future returns, and methods to afford private capital an adequate guide as to where to practice forestry and what kind of forestry to practice. Further research, economic, industrial, and silvicultural, is necessary. It is needed as a guide to public policy and a requisite for public forestry, no less than as a means for furthering private forestry.

The appointment by the President of a timber conservation board has given prominence to the need for better economic data on the whole timber situation. The Forest Service is carrying forward a comprehensive long-time program of forest research, chiefly through a system of regional forest experiment stations as a central laboratory for research in forest products. The forest experiment stations conduct economic as well as silvicultural research. They are making real headway in building up the body of knowledge necessary for forestry.

### WILD LIFE

The Bureau of Biological Survey has continued research work for the solution of complex problems in the conservation and propagation of waterfowl and big game and fur mammals, and in the protection of insectivorous birds and other forms of wild life. It has continued cooperative work for the control of economically injurious species.

The cause of wild-duck sickness, long a baffling problem, was determined during the year. This disease has been taking an intermittent but heavy toll from waterfowl and shore birds for more than two decades. During certain years the mortality on some of the important concentration areas has been far greater than the total kill there by hunters. Though earlier studies (in 1914-1916) conducted under the highly saline conditions about Great Salt Lake, Utah, pointed to certain alkaline salts as the cause, evidence from the past two years' study in Oregon, California, and Utah has demonstrated that the disease is a form of botulism produced by a toxin liberated by bacteria that thrive in decaying animal and vegetable matter. Technically the organism is *Clostridium botulinum*, type C, best known as a cause of limber neck in domestic poultry. Remedial measures can now be taken to prevent

high concentrations of alkaline water; this will serve as a preventive of the duck sickness as now understood, because the substitution of deep fresh water of a constant level for expanses of shallow water and mud flats, with their attendant decay of organic matter, eliminates important factors favorable to the disease.

To coordinate wild-life disease investigations a new unit was established this year in the Bureau of Biological Survey, under which cooperation was continued with other bureaus of the department and with the Universities of Minnesota and Southern California. Close observations on concentration areas of wild fowl, on numerous fur and game farms throughout the country, on game refuges, and on large areas of controlled natural habitat have made it evident that disease takes a large toll of wild life and that conservation measures should include disease control as developed by research.

### Observations in Drought-Stricken Waterfowl Grounds

Investigations conducted throughout the entire country, and on important breeding grounds in Canada, indicate that the status of migratory waterfowl is more serious generally than at any time since the need was recognized for the migratory-bird treaty of 1916. Drought conditions on the breeding grounds in Canada and in the western part of the United States increased in intensity during 1930, and up to the middle of June, 1931, showed no indication of abatement. The hatch of young ducks in the Prairie Provinces of Canada in 1930 was only about half that of normal years. In this great area are bred the major part of the most commonly hunted wild ducks found in the United States during the fall and winter months. The Biological Survey has conducted continuous observations in the drought-stricken areas and has cooperated with Canadian authorities in an effort to obtain reliable information regarding critical conditions during the spring and summer, so that necessary safeguards for the wild fowl may be maintained.

### Changes in Waterfowl-Season Regulations

After consulting the advisory board under the migratory-bird treaty act, the Biological Survey recommended regulations, and these were approved, to reduce the 1931-32 season on ducks and geese by two weeks throughout the United States. To accomplish the greatest possible saving of these birds the time was taken from the beginning of the season in the Northern States and from the end in the South. In 1930 the daily bag limit on ducks had been reduced to 15 and that on geese to 4. Other amendments to the regulations restrict to 10 the number of live-geese decoys that may be used at a gunning stand and make it illegal to shoot mourning doves over baited fields. Drought conditions over three years on waterfowl-breeding areas made limitation of the annual kill imperative, and on August 25, after the close of the fiscal year, continuation of acute waterfowl conditions made it necessary to reduce the open season throughout the country to one month.

### Economic Importance of the Wild-Fowl Resources

The value of game birds becomes increasingly apparent; not only are they of great recreational value, but they also constitute an important game-food supply, and the upland game birds assist agriculture by

destroying weed seeds and insects. Many thousands of families have had living conditions made more agreeable by a game-food supply or by income derived from hunting and providing for the needs and entertainment of hunters. In one State alone during the open season of 1930 more than 2,350,000 wild ducks were killed. The total annual kill of wild ducks throughout North America in recent years has probably been between 10,000,000 and 15,000,000.

The Federal wild-fowl conservation policy has been set forth in the terms of the migratory-bird treaty act, which was passed to protect these birds through regulating the annual kill, and of the migratory-bird conservation act, a measure enacted to insure the permanent establishment of from 60 to 100 great national wild-fowl sanctuaries. The department, through research to eliminate losses from disease, by careful regulation of the annual kill to prevent waste and exploitation, and by the development of a refuge system, is endeavoring to maintain the abundance of migratory birds.

### Migratory-Bird Refuges

During the first two years of the 10-year national program for the establishment of refuges for migratory game birds, approximately 4,000,000 acres in some 200 units have been studied to ascertain the nature of the wild-fowl food resources; land-valuation surveys looking toward purchases were made on 115 of these units, involving more than 3,000,000 acres in 41 States. The Migratory Bird Conservation Commission has approved the acquisition by purchase or lease of 111,517 acres at an average cost of \$3.87 an acre, in California, Colorado, Florida, Nebraska, North Carolina, and South Carolina. By Executive order four refuge areas have been reserved from the public domain in Montana, Oklahoma, Nevada, and California. Added to the lands approved for purchase, these areas bring the total acquisition under this program to 176,244 acres—representing nine migratory-bird refuges.

### Musk Oxen Reintroduced into Alaska

In the summer of 1930, 34 musk oxen were obtained by the Biological Survey through a dealer who captured them in northeastern Greenland. After their sea voyage to New York, by way of Norway, they were held in quarantine a little more than a month as a precaution against the introduction of diseases that might be inimical to other species, wild or domestic. They were then taken by rail to Seattle, Wash., by steamer to Seward, Alaska, and again by rail to the bureau's reindeer experiment station near Fairbanks. Musk oxen formerly occurred in Alaska but disappeared previous to the occupation of their range by Europeans.

### Control of Injurious Wild Animals

In the interests of all branches of agriculture, forestry, and game protection the Bureau of Biological Survey has cooperated for more than 15 years with State and other organizations in work for the control of predatory wild animals and injurious rodents. A special program of control drawn up by the department to cover a 10-year period and authorized by Congress during the year will make more effective the work as already organized. It will also enable the Bio-

logical Survey more adequately to conduct and supervise control operations. The leadership of the department in this work has been requested and encouraged by State and other agencies, and the funds made available from such sources for expenditure under the direction of the Biological Survey have been far in excess of those provided for the purpose from the National Treasury.

## HOME ECONOMICS

The work of the Bureau of Home Economics during the past year was adjusted so far as possible to meet the needs of homes with incomes reduced by the drought and unemployment. Advice and assistance to home makers were furnished through correspondence, radio broadcasting, press releases, and printed bulletins. These efforts were designed to serve household needs, to improve standards of living, and to promote wise use of agricultural products in the home. The program included special studies in low-cost diets, the preparation of food guides for use of extension workers and others in the drought areas, and the dissemination of facts as to cheap sources of "protective foods," especially those containing the factors that prevent pellagra. Thousands of charts and leaflets were distributed for this purpose. In response to a call from the women's division of the President's Emergency Committee for Employment, similar service was extended to families with incomes reduced by unemployment. Recipes for low-cost diets were worked out and distributed.

In cooperation with other institutions the bureau studied the selection of food for children. A report has been prepared indicating the part the nursery school can play in providing adequate meals for children from 2 to 6. Another publication, *Food for Children*, based on an experiment in child feeding at the Washington Child Research Center, has been issued.

The bureau participated in the work of the White House Conference on Child Health and Protection. It is represented on the planning committee of the President's Conference on Home Building and Home Ownership, which is collecting data that should be of great value in bettering housing and home-living conditions.

## Study of Consumer Needs

Dietary surveys of different population groups are in progress. The records, showing consumption trends, are checked against nutritive needs to guide both production and consumer demand. Other investigations deal with the quality of agricultural products. Tests of the palatability of meat as affected by different production factors and by different methods of cutting, handling, or cooking are conducted in cooperation with the Bureau of Animal Industry and the Bureau of Agricultural Economics. The meat used is produced at State agricultural experiment stations. The effect of breeding, fertilization, and storage upon the cooking quality of potatoes is tested in cooperative studies with the Bureau of Plant Industry and the Bureau of Chemistry and Soils. Comparative cooking tests on eight native-grown varieties of rice have shown different lengths of time for satisfactory cooking, thereby lending support to the contention that varieties should not be mixed for marketing.

### Studies of Fabrics

Studies of fabrics deal with the wearing qualities of household materials manufactured from different grades of cotton and wool. Sheets and blankets manufactured from different grades of these materials are tested under controlled conditions of constant use.

Textile-utilization experiments were continued to determine new and more satisfactory uses for fibers grown in this country. The results were made available in popular publications. A farmers' bulletin on window curtaining, a leaflet on slip covers, and another on furnishing living rooms were prepared to encourage a wider use of cotton materials, as well as to help farm families in improving their homes.

### Basic Research

Investigations were continued regarding the standard of living of families on marginal farms in the Appalachian highlands. Information thus obtained was correlated with facts regarding the size and sources of family incomes, the types of soil farmed, the uses made of land, and the character of the schools and other community facilities. Preliminary reports were presented at a conference with the extension service of the University of Kentucky, and at a meeting of the Kentucky Home Economics Association. A second survey was begun in June in Grayson County, Va., an Appalachian community of a somewhat different type.

A study of the food supply of 73 families on marginal farms in South Carolina, where pellagra is prevalent, compared the food habits of families that had escaped the disease with the food habits of families that had not escaped it. It also included comparisons with families of similar economic status and similar diet in mountain regions of Kentucky. The study showed the beneficial effects of adding different amounts of certain pellagra-preventive materials to the diet.

The use of wheat germ and rice polish is recommended in communities where the diet commonly lacks vitamins B and G. These products, however, tend to grow rancid under the usual conditions of storage, and their use is consequently limited. Accordingly a method was sought whereby the home maker might retard the tendency. It was found that wheat germ and rice polish may be preserved by heating them for 9 or 10 minutes in a  $\frac{3}{8}$ -inch layer at 190° C. Formulas were worked out for enriching corn meal with dried skim milk or a combination of dried skim milk and wheat germ or rice polish. Wheat germ is as rich in vitamin B (the antineuritic vitamin) as yeast, and one-half to one-third as rich in the antipellagra vitamin G. Cottonseed flour, slightly less rich in both vitamins, would afford ample amounts of the pellagra-preventive factor for most diets, if used in the quantities found desirable for baked products.

Experiments with meat held at different temperatures showed that the development of bacteria advances markedly at temperature above 50° F., and that meat should be kept at the same low temperature as that recommended for milk (45° or below).

## FOOD AND DRUG ADMINISTRATION

The Food and Drug Administration, a separate bureau of the department, is charged with the duty of enforcing the food and drugs act, the insecticide act, the tea act, the naval-stores act, the import-milk act, and the caustic-poison act.

The independent-bureau status of the Food and Drug Administration is emphasized here because a mistaken idea prevails in some quarters that analytical work incident to the enforcement of these various laws is performed by another bureau of the department, administrative details alone being centered in the Food and Drug Administration. A natural inference from such a misunderstanding would be that the regulatory operations are subject to divided control, a situation which obviously would be conducive to bad administration.

June 30, 1931, marked the twenty-fifth anniversary of the passage of the food and drugs act. Since the measure was passed, revolutionary changes in the food habits of Americans have taken place. Manufactured foods have become a staple and highly important item in the diet of those who live on the farm, as well as of those who dwell in cities. The progressively increasing demand for commercially prepared foods has effected marked changes in manufacturing methods and brought into the field large numbers of new manufacturers. This, and an increasing expansion in the drug and medicine manufacturing trades, have thrown a heavy burden on the Food and Drug Administration. Necessarily limited in personnel and working funds, the administration has concentrated on types of violations which endanger the public health and constitute serious economic frauds upon the consumer. While various attempts to weaken the act have been unsuccessful, and while in general the broad terms of the measure have been remarkably effective, the experiences of the last 25 years have clearly shown that the measure in its present form does not insure all the safeguards to the American consumer that its framers presumably intended. Consequently the department expects to recommend desirable amendments to the act.

### Prosecutions and Seizures

In the course of import and interstate operations under the food and drugs act during the fiscal year ended June 30, 1931, the administration collected and examined 31,859 samples of foods and drugs. Prosecutions and seizures under the law numbered 991 in the case of foods, 885 in the case of drugs, and 101 in the case of livestock feeds, totaling 1,977 actions. Import inspections resulted in the passing of 4,899 shipments of food and 1,842 of drugs, while 2,469 shipments of food and 1,321 of drugs were detained. Since the passage of the law more than 18,000 legal actions have been instituted, involving both the seizure of offending goods and the prosecution of shippers.

### McNary-Mapes Amendment

New tasks were imposed upon the technical forces of the administration by the passage on July 8, 1930, of the McNary-Mapes amendment to the pure food law. Since no special appropriation was made for carrying on work under the amendment, many technical investi-

gations of the administration were temporarily forced into the background following the passage of the measure. The formulation of standards of quality and of condition and fill of container is necessitated by the amendment. Six important classes of canned foods were chosen for preliminary work. These were peas, peaches, pears, apricots, cherries, and tomatoes, for all of which standards were promulgated during the year. The designation "Below U. S. Standard. Low Quality, but not Illegal" was adopted for use in labeling substandard products.

### Corn Sugar Under the Food and Drugs Act

On December 26, 1930, a decision defining the status of corn sugar (dextrose) under the law was announced in the following terms:

Corn sugar (dextrose) when sold in packages must be labeled as such; when sold in bulk must be declared as such; but the use of pure refined corn sugar as an ingredient in the packing, preparation, or processing of any article of food in which sugar is a recognized element need not be declared upon the label of any such product.

Nothing in this ruling shall be construed to permit the adulteration or imitation of any natural product, such as honey, by the addition of any sugar or other ingredient whatever.

In order to bring the existing definitions and standards for food products into conformity with this decision, the definitions and standards as previously published were revised.

### Offenses Involving Public Health

Foods may become dangerous through contamination with poisons, through the development of certain forms of bacteriological decomposition, or through the presence of disease germs. To-day, such contamination is rare in commercially packed foods. The increasing efficiency of commercial food-manufacturing methods in the United States is illustrated by the fact that in the last two fiscal years the administration has encountered no cases of botulism attributable to commercially packed food.

The canning of prunes, an expanding industry in the Pacific Northwest, necessitated some control by Government agents. The 1930 pack, 660,000 cases, was considerably smaller than that of 1929, due to unfavorable weather. The harvest season for prunes in the Pacific Northwest generally comes in September, and at that time last year continued rains and cloudy weather were responsible for the rapid development of brown rot which infected approximately 40 per cent of the crop and caused heavy losses to the industry. The heavy infestation required immediate regulatory action. Officials collected 49 official and 108 investigational samples for examination. This resulted in 20 seizures, involving about 4,500 cases of canned prunes.

A significant legal action concluded during the year involved the interstate shipment of approximately 43,000 cases of canned salmon, found to be partly decomposed. Following seizures of the goods, criminal prosecution was instituted, and the Federal judge of Seattle, Wash., imposed fines of \$350 and \$300 upon the two offending shippers, at the same time expressing regret that the limitations of the statute prevented the imposition of jail sentences.

### Actions Involving Drugs

The Food and Drug Administration tries to protect the public against patent medicines bearing curative claims far in excess of their actual merit. Fraudulent claims made regarding the curative value of an illegal remedy have always been regarded by the department as a definite public menace. During the past fiscal year 570 seizures of falsely and fraudulently labeled proprietary medicines were made.

During the calendar year 1930, 6,189 cans of anesthetic ether were examined. Of these, 313 were found not of United States Pharmacopoeia quality; 82 lots were libeled. A 5-year campaign against impure or low-quality anesthetic ether has resulted in a marked improvement in the quality of this important product. Of 470 cans examined in 1926, 162, or 34 per cent, were found to be low in quality and unfit for anesthetic purposes. Only 5 per cent of the cans examined in 1930 were found to fall in that class.

### Worthless Veterinary Preparations

Progress has been made in the department's efforts to protect the farmer against ineffective veterinary remedies. Interstate commerce has now been cleared of preparations falsely and fraudulently labeled as having therapeutic value in contagious abortion of cattle, hog cholera, and tuberculosis of livestock. Careful surveillance was maintained over proprietary veterinary preparations labeled as having therapeutic value for other diseases of farm livestock and poultry. Internal parasites are of considerable economic importance to the farmer in that they cut down the producing ability and thus the value of his animals. Critical tests of a number of vermifuges were made. An important case, involving a group of veterinary preparations falsely represented as treatments for black tongue, distemper, and running fits of dogs, was concluded at New Orleans when the Government secured a verdict in a contested action.

### Other Regulatory Activities

Nearly 1,500 insecticides and fungicides were examined and, when necessary, submitted to field tests. Thirty cases, representing apparent violations of the law, were reported to the Department of Justice for criminal or seizure proceedings. Disposition of 447 cases involving misbranded insecticides and fungicides was made. When the mislabeling was called to the attention of the manufacturers, they voluntarily made the necessary changes, making it unnecessary for the Government to resort to legal action. Many new combinations in insecticides and fungicides appeared upon the market during the year, requiring considerable laboratory analysis and testing.

A country-wide survey, begun in 1928, of products subject to the caustic poison act was completed. At the close of the fiscal year 1931, 70 per cent of the many thousands of labels encountered were in exact compliance with the requirements of the law. During the year 1 seizure under the act was instituted, and 16 additional cases are in the course of development.

Under the service features of the naval stores act the department's classifiers graded 181,429 barrels of rosin. The collections for this service work, which were turned over to the United States Treasury

as miscellaneous receipts, amounted to \$13,913.62. Two prosecutions covering definitely willful violation of the naval stores act were terminated successfully.

The quantity of tea offered for importation during the fiscal year 1931 was 87,091,330 pounds, an increase of about 2,500,000 pounds over the total importations for the fiscal year 1930. Slightly over 49,000 pounds were rejected, this being only 0.057 per cent of the total quantity offered for entry.

Enforcement of the import milk act is centered at Rouses Point, N. Y., in the heart of the section through which most of the milk from Canada enters the country. As a result of farm and plant inspection work provided for under the act a change for the better has taken place in the sanitary condition of dairy farms, and in plant practices. This improvement was reflected in importations of milk and cream of a uniformly high quality. Many of the plants under supervision have installed a definite farm-inspection and milk-testing system as a routine practice. During the fiscal year 1931, 170 plants and 1,756 dairy farms were inspected. Products from 143 dairy farms were embargoed, and 50 foreign farms were released from previous embargoes. One hundred twenty-five permits to import were renewed.

### TRADING IN GRAIN FUTURES

Trading in wheat futures in the United States showed a sharp decrease as compared with such activity during the previous fiscal year. The total volume of trading on all exchanges designated contract markets under the grain futures act of 1922 amounted to 10,063,139,000 bushels during the year ended June 30, 1931. While this is nearly 50 per cent less than the volume for the previous year, when total sales aggregated 19,606,790,000 bushels, it nevertheless exceeds the low record in 1923-24 by about 38 per cent.

Decreased activity in wheat futures was due in part to the shifting of speculative interest to corn, where a short crop and a closer adjustment between supply and demand furnished greater incentive to speculation. This was reflected in a 50 per cent increase in the volume of trade in corn futures over that of the previous year. Trading in corn futures during the fiscal year ended June 30, 1931, amounted to 5,505,123,000 bushels, as against 3,667,885,000 in 1929-30. The last-named figure, however, was the smallest of record and showed about half as much trading as was done in 1924-25 and in 1927-28.

Some of the decline in trading in wheat futures resulted from the stabilization activities of the Federal Farm Board, in that speculation was naturally reduced in the December, March, and May futures, which were supported by the Grain Stabilization Corporation. Not all of the decline, however, can be attributed to that cause. The unusually large stocks of wheat, a limited foreign demand accompanied by declining prices, and the unsettled condition of the stock market and business generally throughout the world had a marked effect in minimizing speculative interest of all kinds. In this connection, it may be noted that while trading in all grain futures combined during the year ended June 30, 1931, was 17,034,201,000 bushels as against 24,999,650,000 the previous year, a decrease of about 32 per cent, the decrease in the trading in securities on the New York Stock

change during the same period was even greater. The number of shares sold from July 1, 1930, to June 30, 1931, amounted to about 667,000,000 as compared with 1,080,000,000 the previous year, or a decrease of about 38 per cent.

Though the volume of trading in wheat futures during 1930-31 was relatively small, the amount of open contracts reported to the Grain Futures Administration by members of contract markets was large. This contrast is largely explained by the heavy stocks that were carried forward and hedged. It appears that the hedges were absorbed and carried mainly by the so-called general public and by the Grain Stabilization Corporation, which bought large quantities of wheat in the futures markets and took delivery. The general public composed of small traders is usually found on the buying side. It was on the buying side last year, when prices were declining. On the other hand, the so-called large professional traders operated primarily on the short side. This may have reflected superior judgment on their part, but it certainly added to the load on the bear side of the market. Hedgers, however, had a fair measure of protection during the year owing to the prevailing favorable relationships between cash-grain prices and prices in the futures markets.

### Stabilization Operations

Special interest attaches to the results of stabilization operations conducted by the Federal Farm Board between November 15, 1930, the date when stabilization was authorized, and May 30, 1931, when the May future expired. These operations related to the 1930 wheat crop, and established the basis upon which most of that crop was sold. Prior to November 15, Chicago July wheat had sold slightly above the May wheat, but prices had steadily declined since the second week in August. The July future at Chicago continued to decline. It sold below 60 cents in March and again in April and May, 1931. The May price, on the other hand, was stabilized by the Federal Farm Board at above 80 cents throughout most of this period. After stabilization was discontinued the price of the July future declined to lower levels, and on the last day of July sold under 50 cents. Chicago May wheat during January, February, March, April, and May was above the Liverpool price by from 15 to 20 cents a bushel. Normally, when the United States has an exportable surplus of wheat, the Chicago price is below the Liverpool price. Besides being held at a higher level during the stabilization period, the May future was kept within a very narrow range of fluctuation. The average daily range from November 15 to May 30 in the May future was only half a cent a bushel, whereas in the July future the average daily range was 1½ cents. In the dominant futures from May 1, 1930, to November 15, 1930—that is to say, in the five and one-half months preceding the board's stabilization operations—the average daily range was 2½ cents. It is thus obvious that much of the 1930 wheat crop brought prices considerably higher than the prices that would have ruled had the Federal Farm Board not entered the market.

### Action Needed to Correct Abuses

Grain exchanges and grain-futures markets play an important part in our marketing system. The hedging facilities which are offered mill-

ers and dealers generally serve useful purposes, and, on the whole, these markets function efficiently. Action is required, however, to eliminate certain abuses. I referred to this matter in my annual report last year and wish to reaffirm here what I then said. Legislation to strengthen the present grain futures act seems desirable, to eliminate sharp practices in the handling of customers' orders, and to afford a safe and sure means of control over the purely speculative trading of large operators. Under existing conditions the unrestricted opportunity to buy or sell futures enables large traders at times to take advantage of technical situations to the disadvantage, not only of producers and cash handlers of grain, but of the small traders composing the general trading public. Small traders are necessary to maintain a liquid futures market. They should be guaranteed fair play and a fair chance against those with larger means. This is said not to encourage speculation but to emphasize the necessity of making the future-trading system equitable. It should extend equal opportunity to all traders so that its benefits may flow as directly as possible to the producers of grain and the handlers of actual grain and grain products. Existing legislation does not give the Federal Government authority to limit excessively large speculative lines or to limit short selling calculated to demoralize prices.

### EXTENSION SERVICE

Supplementing sources of farm income and maintaining as good a standard of living on the farm as possible with the income in hand were the chief problems to which extension workers gave attention this year. Price-breaking surpluses of wheat and cotton necessitated large production adjustments. The development of new sources of income became imperative. Supplemental lines of production had to be considered and adopted. County extension agents were constantly busy studying the situations in which producers found themselves individually and collectively. Reliable and practical information from State agricultural colleges and the department was in pressing demand. Consulting with farmers as to their operations is not a new activity of extension agents. Crop adjustments have been made with the aid of extension workers in many counties and in entire States. It is a recent development, however, for the entire force of the cooperative extension service to direct its attention largely to problems of agricultural adjustment the country over. Extension problems this year were more numerous, more complex, and more widespread than ever before.

The California Extension Service reported striking results from a 10-year campaign to put dairying on a sound and profitable basis. Production was so increased in volume and efficiency that California's dairy industry in 1930 had a gross income \$25,000,000 greater than that of 1920. The campaign was undertaken following a thorough study of the industry's requirements, prominent among which was greater stability. The objectives were outlined, and the work was conducted steadily to a successful issue.

Extension workers this year helped producers throughout the country to map out programs. Where it seemed advisable to curtail or abandon a line of production, substitute crops or enterprises were considered. Many farmers were encouraged to develop new activities.

They undertook in increased numbers to grow home and farm supplies as much as possible and to build up reserves of feed, seed, and livestock. North Carolina produced \$20,000,000 worth of food and feed more than in 1930. This is an outstanding example of the advantages obtained. The farm women and girls of that State are credited with putting up 2,250,000 quarts of home-grown fruits and vegetables in the past season.

### Soil-Improvement Systems Adopted

In many districts definite systems of soil improvement were adopted, wood-lot and forest-area developments were started, and minor cash enterprises were launched to make up deficiencies in the income from major crops. Closer attention was given to the grading, pooling, and selling of marketable crops. Existing cooperative-marketing associations were strengthened and new ones organized. The establishment of credits on a sound basis was promoted and the use of credit encouraged where adequate returns could be expected. In this last effort local banking institutions and bankers' associations cooperated.

The department and the State agricultural colleges speeded the assembling of economic facts applying to local conditions. At a series of four regional conferences, State and Federal extension workers and economists considered available data. State workers returned to their own fields better equipped to aid in appraising local situations. At local conferences producers were helped to plan their individual farm programs. To strengthen this work 120 economic workers were added to the extension forces.

Home demonstration agents assisted farm women and girls in preparing and selling surplus garden, poultry, and dairy products. The development of home industries progressed. More than 200 operators of roadside markets attended a conference held in New Hampshire at the instance of the State extension service. The West Virginia Extension Service began the promotion of attractive tourist homes and supplemental home industries as sources of income to farm families. Farm women and girls were helped also in the economical buying of supplies, in the preservation of home-grown foods, in the making and remodeling of garments, in the refinishing of furniture, in the making of inexpensive improvements in the house, and in the planting and care of flowers and shrubbery. No other phase of home-demonstration work met with more appreciation than that resulting in the beautifying of the home and its surroundings.

Boys and girls joined in the general effort to augment farm incomes and maintain farm living standards. More than 845,000 were enrolled in 4-H clubs, in which, under the supervision of extension agents, they studied and demonstrated efficient farming and home making. The growing of cotton, corn, potatoes, and other vegetables and the care of calves, pigs, and poultry gave them training in production and marketing. Their activities included preserving fruits and vegetables, cooking and serving meals, making and remodeling clothing, and furnishing and decorating rooms.

The field force employed in extension work on June 30, 1931, totaled 6,179 persons, an increase of 219 over the number last year. In the counties 2,382 county agents, 234 assistant agents, and 167 negro

agents were employed. The home economics staff included 1,241 county home demonstration agents, 36 assistant agents, 10 urban agents, and 123 negro agents. Two hundred and eighteen county club agents and 33 assistants devoted full time to 4-H clubs. Practically all county extension agents gave some time to boys' and girls' clubs. To reenforce the efforts of county extension agents and to assist in dealing with specialized problems there were 1,222 extension specialists stationed usually at the State agricultural colleges. The administrative and supervisory staff in the States numbered 495 persons.

### Appropriations for Extension Work

Federal appropriations amounting to \$6,192,936 were allotted to the 48 States and the Territories of Hawaii and Alaska for extension work under the terms of the Smith-Lever Appropriation Acts and \$1,480,000 was allotted under the terms of the Capper-Kotcham Act. A special appropriation of \$1,000,000 for allotment to the States was made available by the Congress, primarily for extension work in economics and marketing. The direct Federal appropriation for extension work was \$1,755,000, of which \$1,550,000 was for farmers' cooperative demonstration work and motion pictures, \$15,000 for general administrative expenses, \$120,000 for exhibits, and \$70,000 for farm-forestry extension. The States, counties, and other agencies contributed \$15,876,250 for cooperative extension work. The total of all these items available for cooperative extension work with the State agricultural colleges and for motion pictures and exhibits was \$26,304,186.

### INFORMATIONAL WORK

When times are hard for the farmer, technical and economic information that he can put to practical use becomes all the more necessary. The department, consequently, increased its efforts this year to give the public information developed by its research, service, and regulatory activities.

Increased funds, made available by Congress for printing and binding, permitted increased publishing. Manuscripts sent to the printer totaled 1,737, as compared with 1,702 in the previous fiscal year. The number included several emergency publications necessitated by drought and unemployment relief work. Publications are the permanent foundation of the department's informational work. For years there has been considerable delay between the completion of a research project and the publication of the results; now this gap is being narrowed. In the act creating the Department of Agriculture, Congress made the dissemination of knowledge by the department as important a duty as the acquisition of knowledge. Evidence of the extent to which this function is being discharged is furnished by the demand for the department's publications, which are not foisted upon persons who do not desire them, but are mailed only on request. Hence, the fact that nearly 32,000,000 copies of various classes of publications were distributed in the last fiscal year indicates that the publication program is adapted to its purpose. Approximately 12,500,000 of the publications distributed were farmers' bulletins, and 2,058,538 were leaflets. About 17,000,000 copies of technical, semitechnical, periodical, and miscellaneous publications were issued.

### Press Aids Department

It would be difficult to overvalue the help of the press in disseminating agricultural information, particularly in times of economic disturbance, when speedy communication is essential. All scientific facts should be made known quickly. Economic information especially demands almost instantaneous distribution. The press furnishes valuable aid in doing this. Press cooperation is particularly valuable in disseminating data about crops and markets. The press also devotes much space to results gained by the department in production studies, in the control of animal and plant pests, in chemical research, in meteorology, in forestry studies, in wild-life conservation, and in home economics. Though most publications have been forced by the depression to reduce their size, releases issued by the department seem to have been used about as fully and widely as formerly. It is generally recognized by the press, both daily and periodical, that the material issued by the department has practical value. This is shown by a growing demand, not only for press releases, but for articles by the department's specialists. Press associations and syndicates carry such articles regularly.

### The Radio Service

Important advances continued during the year in the department's radio work, further enhancing the valuable service rendered agriculture by this new medium of communication. Radio broadcasting makes available to the farmers much economic and technical information that might otherwise not reach them or might reach them too late to be of full value.

A new network program, originating on the Pacific coast and broadcast in the Pacific and intermountain regions by 8 stations associated with the National Broadcasting Co., was started. In the last two years the department's broadcasting has grown tremendously. In the early part of 1929, it issued one network program through 17 radio stations. It is now issuing two daily programs and one weekly network program through 55 radio stations. Two years ago it put out syndicate programs through 164 stations. Similar manuscript programs now go to the audiences of 234 stations.

Land-grant colleges are cooperating with the department in extension broadcasting, and in surveying broadcasting requirements and possibilities. The projected Federal-State extension program envisages daily 15-minute syndicate programs broadcast through more than 250 cooperating commercial stations. One-third of the land-grant colleges themselves operate radio stations.

It was found desirable in broadcasting to continue emphasizing economic information. The national farm and home hour, the western farm and home hour, and department programs on more than half the individual stations in the United States proved effective means of sending rush information to farm people throughout the country. Better cooperation between agricultural program makers and the nation's broadcasters is desirable. Better correlation between Federal and State subject matter is also necessary. Both these ends are being sought.

## WEATHER BUREAU

Diminished precipitation last year and again this year over large areas was reflected in river stages which in the main were low. This circumstance enabled the Weather Bureau to repair its river gauges and verify zero points. It afforded an opportunity also to strengthen the river-stage service in other respects. Some additional river-stage stations were established. Recent engineering developments, including the building of fine roads and bridges, the development of water resources, and flood-protection work necessitate a more exact study of river stages and a more adequate flood-forecast service. The measurement of low-water stages, which formerly was relatively unimportant, now must be done with extreme care. The Weather Bureau took advantage of the exceptional conditions prevailing this year to improve its facilities for making these measurements. Important advantages are expected, particularly to river navigation, which depends mainly on the Weather Bureau for information about river stages and ice movements.

Extensions were made by the Weather Bureau during the year in its daily weather service, principally in the facilities for obtaining observations from ships in the North Atlantic, the South Atlantic, the Caribbean Sea, and the Gulf of Mexico. In accordance with international agreements, more reports were received from ships of foreign registry. Daily radio bulletins containing ship reports and observations from representative land stations in Europe and Asia were received. This information was particularly welcome because weather reports from overseas previously had not been received regularly. Such reports are now collected at the British Meteorological Office and transmitted to the United States Weather Bureau through radio stations at Rugby and Bar Harbor. Arrangements were made also for getting additional information on barometric changes, on the time and character of precipitation, and on humidity conditions in the United States and Canada.

To meet increasing demands for special forecasts for agriculture, aviation, and other interests, the Weather Bureau, with funds specially provided by Congress, began training forecasters. Candidates selected from members of the Weather Bureau were taught how to prepare maps and interpret weather reports. They received special instruction in meteorology, physics, and mathematics. After preliminary training in Washington, the class was distributed among field stations.

### Service for Air Navigation

Following the passage of the air commerce act in 1926, the annual appropriations of the bureau have provided for notable extensions of its meteorological service in aid of air navigation.

At the close of the fiscal year June 30, 1931, approximately 9,400 miles of airways were provided with continuous, 24-hour service. This represented an increase for the year of about 3,400 miles. In addition, partial service (reports collected only for scheduled flights) was organized for about 3,000 miles of new airways, making a total of about 6,000 miles partially served, or a grand total of about 15,500 miles.

Along with the development of this network of frequent current reports, a system of airways forecasts every three hours was organized

with an extension during the year to three additional centers, Atlanta, Dallas, and Portland. With those previously organized at Cleveland, Oakland, Omaha, and Salt Lake City the country is well covered, except in the northern and southern Plains States and the extreme Northeast and Southeast.

Airways service in Alaska was extended by the establishment of a station at Nome with facilities for making pilot-balloon observations. Airways stations were established also at a number of other points. These stations report on schedule for plane movements by radio, telephone, or telegraph. A number of airways stations were established in the Hawaiian Islands to make reports for interisland flying.

Ten additional pilot-balloon stations were established during the year. One was established at Akron, Ohio, primarily to investigate the effect of wind gustiness on dirigibles.

### AGRICULTURAL EXPERIMENT STATIONS

Through its Office of Experiment Stations the Department of Agriculture maintains close relations with the agricultural experiment stations of the several States and with those of Alaska, Hawaii, Porto Rico, Guam, and the Virgin Islands. It is cooperating with these stations in more than 1,000 research projects, or more than 15 per cent of the projects in which the stations are engaged. This cooperation economizes effort, coordinates different investigations, and prevents duplication of work.

The Federal Government contributes annually about \$4,500,000 to the experiment stations, whose total funds are approximately \$18,000,000 annually. Evidence of the value attached to these institutions is shown by the fact that their support from State and local appropriations and from donations and endowments has increased greatly in recent years. The money spent annually by the stations comes to about \$3 per farm in the United States. It is impossible to measure the money return, but it is unquestionably large.

Research in which the department cooperates with the stations covers national, regional, and local problems. It has to do with the needs of the farm home and with rural-community matters as well as with the production, distribution, and sale of farm products. The results are disseminated by colleges and schools of agriculture, as well as in textbooks, treatises, and bulletins. Experiment station findings obtain wide publicity, also, through the rural press and the radio. They are translated into farm practice especially through the extension services of the different States.

#### Activities of Insular Stations

Special efforts were made during the last year, through the agricultural experiment stations of Alaska, Hawaii, Porto Rico, Guam, and the Virgin Islands, to improve agriculture and rural life conditions in these territories. The work was aided by certain important changes authorized by Congress and by local legislatures in the status of these stations. Under an act of Congress approved February 23, 1929, whereby the benefits of the Hatch Act were extended to Alaska, an experiment station was established in connection with the Alaska Agricultural College and School of Mines. A station operated by the department at Fairbanks, Alaska, since 1907 was merged with the

new organization. This change will extend the scope, effectiveness and application of the research and service work undertaken. It will also encourage local participation in the work.

In Hawaii a consolidation of experiment station work under the joint supervision of this department and the University of Hawaii, which was provided for by an act of Congress passed May 16, 1928, brought about increased efficiency and economy. This legislation, like that passed with reference to Alaska, extended the benefits of the Hatch Act and supplementary acts to Hawaii.

A similar measure approved March 4, 1931, extended the benefits of the Hatch and supplementary acts to Porto Rico. This measure provided for the coordination of experiment station work in the island in accordance with plans approved by the Secretary of Agriculture. The required coordination is under way. It will bring about joint action by the Federal authorities, the insular stations, and other agencies interested in improving the agriculture of the island.

Federal research workers cooperated during the year with the experiment station in the Virgin Islands in efforts to improve agricultural conditions there. Important benefits are expected from a soil survey of a portion of St. Croix which was completed by the Bureau of Chemistry and Soils. Studies were made to determine whether the bay-oil industry, in which the Virgin Islands formerly excelled, can be improved. Federal entomologists cooperated with authorities of the experiment station in a survey to ascertain whether the pink bollworm could be controlled and the cotton industry restored in the islands.

ARTHUR M. HYDE,  
*Secretary of Agriculture.*

# WHAT'S NEW IN AGRICULTURE

## ALFALFA-STEM Nematode Causing Severe Damage in Some Western Areas

In recent years the alfalfa-stem nematode, *Tylenchus dipsaci*, has appeared in certain areas of the Western States. Its ability to injure the crop severely has been demonstrated in almost every instance, the amount of damage sometimes being one-half to three-fourths of the crop. The heavier losses occur on fields in which the alfalfa has been allowed to remain growing for five or more years, younger alfalfa growth seldom being severely infested unless planted immediately after an old infested crop was removed from the same field.

### Description and Habits of the Stem Nematode

The organism causing the disease is an active, slender, nearly colorless, eel-like worm averaging about one-twentieth of an inch in length. Its mouth bears a strong spearlike organ with which it punctures the plant tissues and makes an opening through which it enters.

The opening is usually at the growing point of the shoot or at the leaf axils.

The nematodes pass the winter in a quiescent, inactive state in the small alfalfa produced in the fall and in the soil and rubbish about the crowns. With the advent of spring they attack the first young shoots of alfalfa as soon as they appear. Frequently the shoots are killed outright, but if they survive the attack they become thickened, clublike, and deformed. (Fig. 1.) As the season advances these stems will be found to have swollen, blackened bases which break off easily when pulled, and the interior will be found decayed. Such stems frequently die after growing a foot or two high. Occasionally colonies of nematodes become established a foot or more above the ground and cause swollen areas on the stems. (Fig. 2.)



FIGURE 1.—Shoots from an infested plant showing the typical clubbed appearance

Microscopic examination of an infested stem reveals thousands of nematodes in all stages of growth. Those that enter in the spring are usually, if not always, the preadult form, and after feeding for a few days they mature and mate, and egg production begins. The eggs hatch immediately, the young begin feeding, and the colony soon contains nematodes in all stages of growth. Several generations occur in a single season.

If the plant dies, most of the nematodes leave and migrate to surrounding plants if the soil is moist. Such migration is not possible through dry soil. For this reason, plants that once have been heavily

infested may not contain nematodes if examined after they have died.

Appreciable injury the first year of infestation is uncommon unless unusually large numbers of nematodes are present, but in the second year the killing of the shoots and the subsequent decay of the crown may weaken the plant rapidly. However, it may survive for many years depending upon its vitality, the fertility of the soil, and the severity of the infestation.



FIGURE 2—Alfalfa plant infested with stem nematode.

#### Appearance of Infested Fields

Infestation usually first appears in small areas and is indicated by stunted or dying plants. The size of the damaged area increases year after year, especially in the direction of water flow. This is a

marked feature in irrigated fields. Injury is usually most prominent in the first cutting of alfalfa, for the cool, moist spring months appear to be more favorable for the nematodes. Later in the season it may be difficult to find typically infested shoots.

#### Control

Crop rotation is the only known method of control under ordinary field conditions. Under a systematic crop rotation in which alfalfa is allowed to remain not over three or four years, there is less danger of serious loss. When an alfalfa field becomes infested to a point where serious loss occurs, it should be plowed up and planted with other crops for at least two or three years, care being taken to eliminate all alfalfa plants and weeds. Suitable crops for rotation include sugar beets, wheat, corn, barley, beans, and peas.

Fortunately the alfalfa-stem nematode, so far as known, does not adapt itself readily to other plants in this country, but in certain foreign localities it has been found to infest oats, potatoes, and clover seriously. Therefore, while the nematode may not attack these crops in

the Western States, it is advisable not to use them in a rotation on an infested alfalfa field if others in the list of suitable plants can be grown advantageously.

The most common means of transportation into a locality is infested seed that carries the nematodes in dirt and fragments of infested stems. To prevent introduction of the nematodes into clean fields only well-cleaned seed should be used. Seed that has passed through the cleaner two or three times is much less likely to carry nematodes.

Distribution from infested areas to neighboring fields occurs through the movement of hay, soil, machinery, and irrigating water. Therefore, when once an infestation is located, care should be exercised to avoid spread.

GERALD THORNE, *Bureau of Plant Industry.*

**BEE-CULTURE** Research Recently Inaugurated on the Pacific Coast In the spring of 1931, the Pacific Coast Bee Culture Field Station of the United States Bureau of Entomology was established in the new, fireproof Animal Science Building of the College of Agriculture, University of California, on the university farm at Davis, Calif. At this station it is planned, not only to undertake problems in beekeeping which pertain to California, Oregon, Washington, Nevada, and Arizona, but also to include such other research of general importance to the industry as can best be studied on the Pacific coast.



FIGURE 3 — A 1,000 colony apiary which was moved into the Porterville, Calif., orange area for the orange honey flow; 25 000 colonies were moved into this area for a few weeks

An increasing demand for research in beekeeping has accompanied the changes in agriculture in the great honey-producing territory of the Pacific coast. New problems confronted the beekeeper as the ranches turned from the production of beef to wheat, then to alfalfa, and more recently to cotton and deciduous and citrus fruits, or to vegetables and seeds. Associations of beekeepers felt that Federal research was necessary, and the new station was established to meet this need.

The station is now attacking basic problems confronting the industry, thus laying foundations for detailed research. Studies of the economic aspects of the beekeeping industry and of the relationship between beekeeping and the production of fruit are being made. Conditions are being investigated to ascertain why beekeeping is carried on with profit in some Pacific coast districts and why it is not profitable in other districts. This necessitates a study not only of production and distribution of beekeeping products but also of beekeeping man-

agement, of the distribution of nectar-secreting flora, and of weather and soil conditions, as all these factors have definite and important influences on the income which a beekeeper may derive from his business.

### Relationship Between Beekeeping and Fruit Growing

Recognition of the important rôle played by the honeybee in production of crops of fine fruit has brought about increased use of bees for pollination. The relationship between beekeeping and fruit-growing is not yet clearly understood either by the beekeepers or by the fruit growers. The two activities should be of mutual benefit, but there are a number of problems, such as the use of poisonous insecticides and the belief in some quarters that the honeybee is one of the agents in the spread of fire blight, which for the time being complicate the issue.

Some important tasks of the station, therefore, will be to work out satisfactory practices for pollinating orchards in sections where heavy losses of bees from poisoning may be expected, and to determine exactly what part honeybees play in the dissemination of fire blight, as well as to prepare standards of strength and number of colonies.

With the establishment of the new station, the honey producers in the great beekeeping territory of the Pacific coast, who have been more or less isolated from direct contact with the research conducted by the Division of Bee Culture, have been given an opportunity to take up their problems directly and with little inconvenience.

E. L. SECHRIST, *Bureau of Entomology.*

**B**EEF-CATTLE Finishing by Supplementing Pasture Is Increasing in Texas

Texas, with a colorful history as a beef-producing region, is now undergoing a rather noteworthy change in the tendency toward finishing cattle by supplementing pasturage with other feeds.

Preparing cattle for market other than with pasturage is comparatively new to Texas stockmen. There is little cattle-feeding tradition in the State, and this is particularly true of those regions which have been recently released from cattle-tick quarantine.

There must be recognized a distinction between farm feeding, which is a recent movement, and the feeding of cottonseed meal and cottonseed hulls at or near cottonseed-oil mills, a practice which has been carried on for many years. Meal and hull feeding is of a sporadic type, however, in that few of the same men feed meal and hulls every year. It usually happens that a cattle owner for one reason or another conceives the idea of sending some of his cattle to an oil-mill feed lot for fattening. These cattle are often the culls of the herd and as such may include old cows with calves, cull yearlings, and some old bulls. At times uniform herds of good-quality aged steers are thus placed on feed, but as a general rule the cattle fed on meal and hulls are of poor quality.

### Surveys Show More Cattle Fed

The movement toward feeding cattle on the farms of the State is only about 3 years old. A recent survey report by county agents in 88 counties indicated that 507 feeders were finishing 70,088 head of cattle,

of which 70 per cent were calves. A decided upward trend in the number of farmers who utilized home-grown feeds in finishing cattle during the feeding period of 1930-31 is shown in this report. A similar survey made the previous year showed feeding of cattle in only 50 counties, in which 211 feeders were finishing 40,000 head. Analysis of the 1929-30 report showed that more than half of the cattle were being fed by commercial feeders, mostly in the vicinity of Fort Worth, whereas the report for 1930-31 showed that three-fourths of the cattle were being fed by farmers and ranchmen.

A study involving 60 cattle feeders in the central Texas blackland belt showed that of the 8,540 cattle on feed 51.2 per cent were calves, 38.5 per cent were yearlings, and 10.3 per cent were older cattle, including cows and 2 to 4 year old steers. Most of the calves fed were of good quality. Approximately 50 per cent of these calves, however, were sent to market unfinished and as such were resold as stockers and feeders. Several factors contributed to this situation, one of which was lack of experience in feeding cattle for market. The financial results of the last two seasons of feeding have served to emphasize the necessity of low-cost gains.

#### Promising Feeding Systems

Feeding demonstrations involving the use of various roughages, grain sorghums, corn, and combinations of these feeds with cottonseed meal have resulted in well-finished cattle, when the cattle were fed a sufficient time. Two methods of producing marketable finished cattle in Texas give particular promise of being successful. One is feeding yearling cattle on sorghum silage and cottonseed meal. These cattle may receive grain, in addition to silage and cottonseed meal, if their quality justifies the additional expense. The other method is creep-feeding calves to be marketed either as fat slaughter calves or, with additional feeding in the dry lot, to be marketed with more weight and finish.

JOHN H. JONES, *Bureau of Animal Industry.*

**B**EEF Cattle, if Vigorous, Stockmen in the northern Great  
Can Be Wintered on Range Plains have long been confronted  
in Northern Great Plains with the problems of economical  
feeds and of methods of winter-  
ing breeding cows. These have been subjects of research by the State experiment stations and the United States Department of Agriculture. Contributions have been made by these agencies concerning feed requirements and rations for feed-lot use, but information concerning wintering on the range is still very limited. The methods best adapted to any locality in this range country are largely controlled by severity of weather conditions, availability of grazing land, and the quantity of stored feed available.

The northern Great Plains comprise approximately 130,000,000 acres of land in central and eastern Montana, the western part of the Dakotas, and a small corner of northeastern Wyoming. This area is drained by the Missouri River and its tributaries. The soil of the region, with the exception of eroded badlands, is generally fertile. Rainfall is the limiting factor in range-grass and feed-crop production. The annual precipitation ranges from about 13.8 inches at Miles City, Mont., to 16.8 inches at Ardmore, S. Dak.

The land types of the region consist of 54 per cent grazing land, 13 per cent grazing-forage land, 12 per cent farming-grazing land, 12 per cent farming land, 7 per cent national forest, and 2 per cent irrigated land. The total grazing land is approximately 74 per cent of the total acreage. Because of its location, climate, soil, and vegetation, this region is primarily adapted to grazing; most of the crops for winter feed must be derived from native vegetation or feed crops grown under semi-arid conditions. Summer droughts, with subsequent shortages of water and range grass for winter and summer use, occur from time to time, as do severe winters with deep snow. This is a region, therefore, where feed and water reserves must be stored for periods of shortage.

### Older Animals Winter Best

Stockmen in this region use various methods of wintering cows, the choice being influenced by the resources of the ranch involved. Any method that will carry a cow in such a way that she can be turned on to spring range in a strong vigorous condition at a minimum outlay of feed and expense is satisfactory. Calves and yearlings do not winter so well on the range as do older animals. Breeding cows and mature steers that carry good flesh can be economically wintered on the range, but they will suffer loss in weight which, however, is regained later on summer grass. Cows from which calves have been weaned in October, and that carry good flesh when winter weather arrives, can lose from 75 to 150 pounds during the winter and still produce normal calves. This is about the weight loss to be expected under average conditions where cows are wintered either on the range without supplement or in the feed lot with straw. These cows require more attention and closer observation than cows or steers carried with a fair amount of supplemental feed. The owner must be able to recognize symptoms of weakness and should promptly move weak animals to a hospital lot where more abundant and nutritious feed is available. Cattle wintering on the range require daily attention to prevent death losses. Falls into deep washouts are common, and injuries occur more frequently on the range than in the feed lot.

### Natural Shelter Desirable

Wintering breeding cows and mature steers on the range involves a number of problems which must be given careful consideration if satisfactory results are to be obtained. In the first place, grazing land selected for winter range should be protected from grazing during the previous summer season. This land should contain rough hills and draws for bed grounds and natural protection during storms. An adequate supply of water should be available either from streams or from tanks kept free from ice. Because of snow on the range, grazing cattle do not require water so frequently in winter as in summer, but they must not lack water. Salt should be put out near the water supply to induce liberal use of water. Winter range should be close to a winter feed supply in order that weak cows may be removed to the feed lot with as little trailing as possible. The area of range per cow required for a 5-month period should average from 10 to 40 acres, the area depending on the density of the sod, the growth of grass, and snowfall during the winter. Rough, broken-up ranges generally supply more winter grazing during periods of deep snow than flat, exposed areas. Snowplows can be used very effectively to uncover grass on level regions during periods of deep snow.

### Cottonseed Cake as a Range Supplement

Very satisfactory results have been obtained through the use of cottonseed cake fed, as a supplement, to cows on winter range. This supplement increases the winter cost, however, and its profitable use depends on the severity of the weather, condition of cattle, and quality of range forage. Nut-size cake, containing 43 per cent protein, is satisfactory where cattle are fed on the ground. A common and perhaps the most practical method of feeding the cake is to carry it to the range on a pack horse and feed cattle in small groups with as little movement of the cattle as possible. A measure of known capacity is valuable in obtaining an equal distribution of cake if the bunches of cattle are small. From 1 to 2 pounds of cake per head per day, or every other day, depending on the weather and condition of the cattle, is a common rate for feeding this concentrate. At the United States Range Livestock Experiment Station, Miles City, Mont., cows which were fed an average of 103 pounds of cake on the range during two mild winters (1929-30 and 1930-31) maintained their weight, whereas a similar group of cows on the range without cake lost an average of 27.9 pounds a head.

### Range Wintering Results

The herd of Hereford breeding cows at the same station was carried on the range and in the feed lot through four winters, from 1925 to 1929. The objects were to determine (1) the percentage of cows in a breeding herd which, under average conditions, can be wintered on the range, (2) the effect of the loss in weight during the winter, as affecting subsequent gains on grass the following summer, and (3) the effect on the calf crop as shown by the number and weight at weaning time. This work was carried out along practical lines; strong cows were kept on the range all winter, and weak individuals were brought to the feed lot at different periods during the winter. Weak cows were kept in a hospital lot for a short period after removal from the range until they recuperated and then were placed with the regular feed-lot group, where straw and cottonseed cake were the principal feeds. A limited quantity of alfalfa hay was fed with straw during one winter and a heavy feed of corn silage during a second winter. Toward the close of one winter cottonseed cake was fed for 30 days on the range.

The range utilized during the winter was rough but well supplied with forage and with naturally protected bed grounds. It had been protected from grazing during the preceding summer season. The area, approximately 10,000 acres, greatly exceeded the grazing requirements of the cattle, as they trailed around constantly. Range forage consisted of western wheatgrass, grama grass, and needle grass. Water was pumped by windmills and stored in tanks, which were kept partly free from ice by the use of tank heaters.

Cows on the range all winter suffered an average loss in weight of 80.8 pounds, which was regained before the calves were weaned the next October. These cows were mature; only a small number were young or very old cows. This range-all-winter group comprised 53 per cent of the entire breeding herd through a 4-year period.

Cows on the range and in the feed lot suffered an average range-weight loss of 77.3 pounds. They gained 47.3 pounds in the feed lot and, therefore, suffered an average net loss of 30 pounds. This loss was also regained by the time the calves were weaned in October. The

range-and-feed-lot group comprised 47 per cent of the herd. During the winter this group was on the range 60 per cent of the time and in the feed lot 40 per cent of the time. The cows fed during the entire winter represented approximately 20 per cent of the entire herd.

The average weaning weight of the 408 calves produced through this 4-year study was 379.3 pounds. Calves produced by cows carried on the range all winter weighed 4.4 pounds more than this average, whereas calves produced by cows on the range and in the feed lot weighed 5.4 pounds less than the average.

### Range Wintering Not Harmful to Breeding Cows

From 50 to 75 per cent of the cows in a breeding herd in good physical condition in the fall can be wintered on the range, under average weather conditions, when satisfactory range is available and good management practices are followed. Wintering on the range does not injure breeding cows and permits the accumulation of feed reserves for severe seasons. The conditions at the Miles City station with regard to climate and range are typical of the northern Great Plains, and results obtained in winter range work with breeding cows are generally applicable to northern Great Plains conditions.

A. I. BAKER, *Bureau of Animal Industry.*

### BEEF-COW Herd, When Properly Managed, Is Aid to Farm Income

The production of beef cattle is an enterprise that fits in well with a program of sound farm economy. This is especially true of a herd of beef cows which can be pastured to advantage during the spring and summer on land which is too rough for crop production or, for other reasons, is unsuited to that use. Later the cows will make effective use of such aftermath as stalk fields. Feeds of that class cost much less than hay and grain and save labor expense, particularly if the grazing areas are fenced.

Of course some labor will occasionally be needed, as for example, in making certain that water and salt are available to the herd, possibly in assisting at calving time, and in castrating when the calves are 3 or 4 months old. The practice of creep feeding the calves when they are on pasture with their dams will also periodically require a small amount of labor in filling the self-feeder. Although essential, these tasks are not heavy and need not involve the employment of extra farm helpers.

### Winter Maintenance Cost Important

If the beef-cow herd is to increase the farm income materially, it is essential that cost of the winter maintenance be kept at a minimum. In fact, on most farms the winter season affords probably the greatest opportunity for feeding the herd in a manner that will insure low costs for the entire year. Excessive increase in weight is unnecessary and unprofitable. Nevertheless, it is important that the cows and bull have enough feed to maintain their condition and thrifty appearance throughout the winter months.

Experimental results show that a winter gain had best not be over 50 to 75 pounds and that even a loss in weight of 25 to 40 pounds a head is not objectionable, provided the cows remain in thrifty condition.

A ration composed of silage, cottonseed meal or other protein concentrate, and straw will effectively maintain the herd at relatively low cost, but requires the purchase of the protein concentrate. However, a combination of corn silage, soybean hay, and wheat straw, all home-grown products, will be equally satisfactory. Shock corn, mixed hay, and straw may be used if silage is lacking, but these feeds are likely to prove less economical than those already mentioned.

The United States Department of Agriculture, in cooperation with the West Virginia Agricultural Experiment Station, has conducted experiments in wintering herds of cows in West Virginia. The results show a difference in the total cost of wintering a breeding herd of as much as one-third, between two of the rations fed, even when minimum quantities needed for maintenance were supplied. A careful consideration of feed combinations is extremely important if the herd is to be managed economically.

### Creep-Fed Calves Develop Rapidly

To obtain such economy, maximum use of native and other pasturage in the spring, summer, and fall must be made. The calves may be creep-fed to advantage while on pasture with their dams, a practice which should increase the weight of each calf about 100 pounds by weaning time as well as develop a greater degree of finish by the time it is ready for market.

Beef cattle play a part in conserving soil fertility. Feeding home-raised grain, hay, and roughage helps to prevent the loss of fertility that would otherwise result from the removal of soil nutrients in the form of cash crops.

E. W. McCOMAS, *Bureau of Animal Industry.*

### BEF Heifers Compare Favorably with Steers in Meat Experiments

As meat animals, heifers usually sell at a lower price per hundred pounds than do steers of similar grade and weight. The principal reasons advanced for this price discrimination concern relative finish or fatness, the claim that heifer carcasses tend to be excessively fat or wasty being widely made. This differential directly affects the producer when he disposes of young females not required for breeding purposes and, considering the large number of heifers marketed in the United States, it amounts to a very large sum of money each year.

Cooperative experiments for the study of this problem have been conducted recently as a part of the national project, cooperative meat investigations. The institutions participating in these experiments were the Arkansas Agricultural and Mechanical College; the agricultural experiment stations of Arkansas, Colorado, Michigan, Missouri, Mississippi, and Ohio; Sni-a-Bar Farms at Grain Valley, Mo.; and the Bureau of Animal Industry, Agricultural Economics, and Home Economics of the United States Department of Agriculture.

### Fatness or Finish in Relation to Weight

In each of 12 experiments good beef-type steer and open (unbred) heifer calves of similar age, breeding, and previous feeding and management were fattened on like feeds and slaughtered at the same time after the same length of feeding period. The experiments included a total of 140 steers and 137 heifers. All were graded individually as feeders, as slaughter cattle, and as beef carcasses by committees of three men representing the State experiment station concerned and the department. Of the various characteristics of each individual so graded only three carcass characteristics are considered here. These are (1) amount of kidney and crotch fat, (2) thickness of external fat, and (3) amount of intermuscular fat. All are important indications of finish.

A carcass-grading chart adopted by the cooperators in the national project was used in the work. The chart provides for recognition of nine major degrees of finish, with three subdivisions of each. Table 1 gives descriptions of the different degrees of finish with the corresponding market grade indicated in each instance.

TABLE 1.—Description of different degrees of finish with reference to kidney and crotch fat, external fat, and intermuscular fat of beef carcass

[The corresponding market grade is shown in each instance]

Kidney and crotch fat	External fat	Intermuscular fat	Market grade of carcass
Extreme amount	Extremely thick	Extremely abundant	Good.
Unusual amount	Unusually thick	Unusually abundant	Choice
Large amount	Very thick	Abundant	Prime
Moderate amount	Thick	Moderately abundant	Choice
Slightly deficient	Moderately thick	Slightly deficient	Good.
Moderately deficient	Slightly thin	Moderately deficient	Medium
Deficient	Thin	Deficient	Common.
Very deficient	Very thin	Very deficient	Cutter
Extremely deficient	Extremely thin	Extremely deficient	Low Cutter.

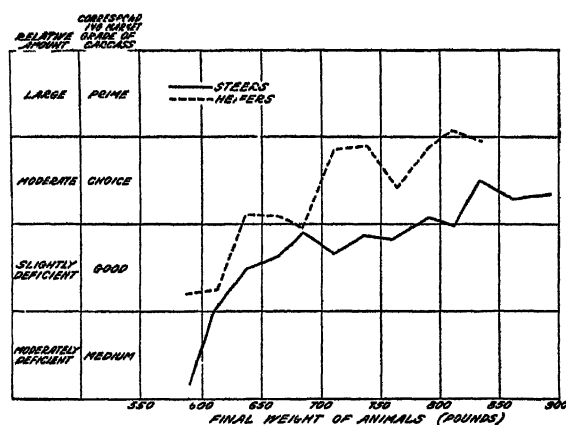


FIGURE 4.—Quantity of kidney and crotch fat in relation to final weight for well-bred steers and heifers

It will be noted in the classification that only seven market grades of carcass are represented, ranging from Prime down to Low Cutter. When the finish exceeded "very thick," with reference to external fat as an example, it was graded down to Choice or Good.

The relation between final feed-lot weight and amount of kidney and crotch fat is shown in Figure 4.

In general, at all weights the heifers exceeded the steers in amount of kidney and crotch fat, a rather wide difference appearing between the sexes at a majority of the weights. It is of particular interest to note that the heifers reached a given degree of finish at a distinctly

lighter weight than the steers. For example, the heifers reached the degree of finish characterized by "moderate amount" of kidney and crotch fat at approximately 650 pounds weight, the steers at approximately 790 pounds. At about 800 pounds the heifers had reached the range represented by "large amount." No steers reached this degree of finish although some were fed to a weight of approximately 900 pounds.

As to the relation between final feed-lot weight and thickness of external fat (fig. 5) it appears that up to about 625 pounds weight there was very little difference between the sexes. At heavier weights, however, there was greater difference, with the heifers consistently showing the thicker fat. In external fat the heifers reached the degree of finish, "thick," at about 700 pounds weight, whereas the steers did not attain this finish until they weighed approximately 835 pounds. Neither sex in these experiments reached the degree of finish, "very thick," in external fat.

A longer fattening period with greater gain would have been necessary to accomplish this.

Final feed-lot weight and amount of intermuscular fat (fig. 6) showed much the same trends and differences. The heifers and steers reached the degree of finish, "moderately abundant," at practically the same weights as those at which they had reached the corresponding degree of external fat, or at about 700 pounds and 835 pounds, respectively. Neither steers nor heifers acquired enough finish to be judged as having "abundant" intermuscular fat.

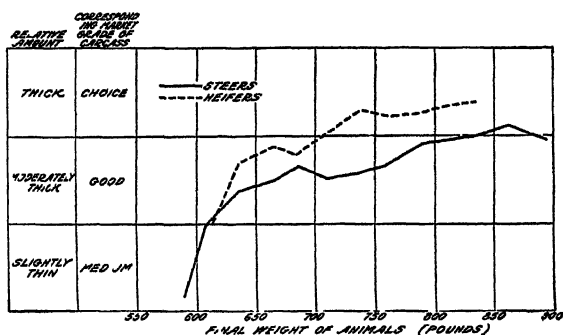


FIGURE 5—Thickness of external fat in relation to final weight for well-bred steers and heifers

### Dressing Percentages

The weight of the dressed carcass of a meat animal in relation to the live weight is always an important consideration. The relationship, or yield, is commonly expressed in terms of dressing percentage. With cattle, small differences in dressing percentage represent relatively large differences in pounds, due to the rather heavy weights commonly involved.

In these experiments 56 representative steers and 54 representative heifers were slaughtered under carefully controlled conditions and dressing percentages were determined. In 11 of the 12 experiments the representative heifers were lighter in weight at the close of the feeding period than the steers. The average difference for the 12 experiments was 76 pounds, the steers averaging 780 pounds in weight and the heifers 704 pounds.

In 7 of the 12 experiments the steers exceeded the heifers in dressing percentage. In the five other cases the heifers exceeded the steers. The average difference for the 12 experiments was so slight as to appear of

no significance. In general the heifers dressed fully as high in percentage as the steers, although weighing an average of 76 pounds less than the steers at the end of the feeding period. At common final weights the heifers tended to yield a slightly higher percentage of carcass than the steers.

### Palatability of the Cooked Meat

To the consumer the palatability of cooked meat is always of direct interest; to the producer, packer, and retailer it is also important, though less directly so. To compare the palatability of the meat of the sexes, standard rib cuts were taken from the same 56 steers and 54 heifers and roasted by a strictly uniform method. The department meat-judging committee, consisting of five persons, graded the cooked

meat for tenderness, quality and quantity of juice, texture, intensity and desirability of aroma, flavor of lean, and flavor of fat.

The result showed no significant preference for the cooked meat of one sex over that of the other. The data justify no practical distinction between the sexes with respect to palatability of the meat.

In general the experiments suggest that if a moderate quantity of kidney and crotch

fat and of intermuscular fat, together with a thick covering of external fat, is desired in the carcass the typical heifer should be slaughtered at about 725 pounds weight, the steer at about 850 pounds. The heifers tended to yield a slightly higher percentage of carcass than the steers at common final weights. No practical difference in palatability was shown. From these results it appears that up to the point where the heifer becomes excessively fat, price discrimination against her is not justified.

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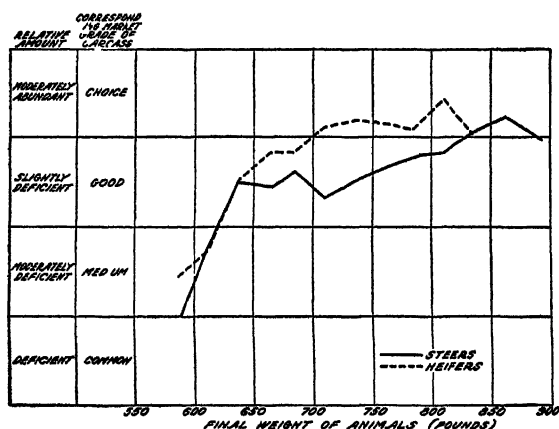


FIGURE 6—Amount of intermuscular fat in relation to final weight for well-bred steers and heifers

### BEET Leaf Hoppers' Origin Important in Control and in Prediction of Attack

where it transmits the disease commonly known as curly top to beets, tomatoes, beans, and other crops.

An effort has been made to determine which of the many breeding areas in the western part of the United States are responsible for infesting the various sugar-beet growing sections, particularly in Colorado, Utah, and Idaho. The general source of the bugs infesting the large

The beet leaf hopper, *Eutettix tenellus* Baker, migrates long distances from its desert breeding grounds to the cultivated areas,

California beet-growing area is already quite well known, although much remains to be determined about the details of the pest's flight and the relative importance of various portions of the breeding area. This information is essential before the possibilities of reducing populations in the breeding areas, either through reduction of the host plant or by direct action against the insects, can be determined and accurate estimates of probable injury can be made.

The study of breeding areas from which this pest infests the three States named has brought forth some very definite information on the distance of flight which has heretofore been lacking as far as the Mountain States are concerned, but which tends to confirm some of the findings of earlier workers regarding distances of flight in other regions. During the spring of 1931 flights of 250 to 300 miles into the central Utah sugar-beet area were made. These flights, although reaching their maximum distance in a week or 10 days, apparently consisted of a series of short hops, by which the infestation was carried gradually farther from the breeding area.

#### Methods of Determining Source and Movement of Insects

Two methods have been used in checking the direction, intensity, and speed of these movements and in locating the source of the migrating insects. One method is illustrated by the study of the movements in Utah in 1931.

There are at least three possible sources of the leaf hoppers that infest the beet-growing region from the Great Salt Lake south in Utah, as indicated by areas where *Eutettix* is known to breed in large numbers. One of these is to the south in Utah, Nevada, and Arizona; a second to the west in western Nevada; and a third in the San Rafael and adjoining deserts in eastern Utah. Small breeding areas occurring around the Great Salt Lake can be disregarded in this discussion because, as the insects matured much later, only the young, unwinged stages of the spring brood were present at the time of the first infestation. The method of investigation involved ascertaining the distribution of the leaf hopper previous to flight, detecting and tracing the daily progress of the first movements, and determining the size of populations along routes leading toward the suspected breeding areas. Three routes were selected, one leading toward the western Nevada territory, a second toward that in southern Utah, and a third toward the eastern Utah section; and careful population studies were made along them before the first insect flights. Previous experience had indicated that populations of the leaf hopper on favorable hosts become higher as the source of the insects is approached. Early surveys along these dispersal routes indicated an almost total absence of the leaf hopper, the few present being dark overwintering forms in contrast to the light-colored spring forms which are almost exclusively present in spring dispersal flights. The first influx of the leaf hopper was discovered at the southern end of the beet-growing area at Richfield, about 170 miles south of Salt Lake City. The men assigned to the various routes were notified by wire and each possible route of movement was carefully checked. The results were negative except for the route leading toward the southern Utah and Nevada breeding areas, where the population increased with progress southward. One observer, following the daily progress of the infestation northward, found that the sugar-beet area

around Great Salt Lake was reached on the fifth day after the bugs were discovered in Richfield.

A second method of determining the source of the flight and the size of the movement has been utilized at Twin Falls, Idaho, where the beet-growing section is rather closely surrounded on all sides by at least potential breeding areas. This has involved the use of a trap (fig. 7) devised for intercepting the insects in flight. The insects are screened out of the air passing through the trap and are concentrated and killed in a cyanide jar attached to the bottom. These traps are mounted on poles at heights of 10 to 50 feet and placed around the beet area in such a way as to intercept flight from all directions.

Counts of the catches at regular intervals indicate the intensity of the flight throughout the season, and the distribution at various trap stations shows the direction from which the insects are coming. These data, when combined with data on the distribution of infestation in cultivated and breeding areas, point to the source of the leaf hoppers.



FIGURE 7.—Traps used in studies of leaf-hopper dispersal at Twin Falls, Idaho

### The Problem of Long-Range Prediction

This work in Idaho has emphasized the difference in source of leaf-hopper infestation from year to year and has brought out some of the difficulties in long-range prediction of leaf-hopper abundance. The 1930 infestation came mainly from one area, the 1931 from another. Although the 1930 contributing area had fairly high early populations in 1931, these were practically eliminated by drought early in May and no bugs were brought to maturity for the spring flight. In other years, undoubtedly both areas have contributed. The relative importance

of the various breeding areas has probably varied from year to year according to initial populations, winter severity, precipitation during the fall and spring months, and host-plant development. Except for the spring rainfall, all these factors can be determined before spring development. Spring rainfall and temperatures occasionally affect the final populations in a given area to an extreme degree, even to the point of wiping them out almost completely, as this year in the one area which has been mentioned. Under these conditions accurate analysis of the results in any year is closely associated with the correct estimate of the relative number of leaf hoppers contributed by each of the possible sources. Early estimates of probable abundance must take into consideration local conditions in the breeding areas of highest populations and their previous contribution to the spring flight under comparable conditions.

Accurate determination of the exact source of the infestation for each year is thus a problem of major importance, and its solution will contribute much to an understanding of factors involved in determining the size of the flight and the consequent amount of injury.

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## **B**ERRY Breeders Seek New Varieties Adapted to Specific Purposes

In breeding new berry varieties it is essential to recognize the desirable qualities as well as the weaknesses of the commercial sorts now grown in the regions of the country for which the new varieties are intended. The use now made of each variety in the home, in the restaurant, and in industry must also be considered. As far as possible new varieties should possess the desirable qualities of the present commercial sorts in the various regions and the qualities desired by industries, and should not have the weaknesses of present varieties. New uses may be found for varieties with new qualities.

Berry breeding by the United States Department of Agriculture is directed to specific objectives, as, for example, producing a leaf-scorch resistant strawberry for the South; a strawberry variety with fruit resistant to the rots for humid regions; a mildew-resistant productive sort of the Clark type for the Hood River section; varieties that do not turn bitter during the harvesting season for regions having hot, dry weather; varieties with tough skins for long-distance shipments; deep-red acid varieties for canning; light-red tart sorts for preserving; and sweet, highly flavored varieties for eating out of hand. Similarly, raspberry breeding is directed toward obtaining better preserving, canning, and shipping sorts, and developing varieties for the Southern States through utilizing foreign species. In blackberry breeding emphasis is being placed on breeding for thornless sorts, for firm berries with high flavor, and for hardy varieties with the desirable flavor of the Logan and the Young.

Usually the desirable qualities in any two varieties of strawberry may be combined in a new variety if a sufficiently large number of crosses are made. The seedlings resulting from a cross of two sorts usually form a series grading almost imperceptibly from one parent to the other. In raspberry and blackberry breeding the results are usually what would be expected in Mendelian inheritance. The most difficult part of all berry breeding lies in recognizing the best among a large number of seedlings.

### **The Ettersburg 121 Strawberry**

The rapidity with which industries adopt varieties better adapted to specific uses is best illustrated by the case of the Ettersburg 121 strawberry. This variety was introduced about 1913. Its superior canning qualities were soon recognized, and it became prominent in Oregon about the time of the World War. At present most of the strawberries canned in the United States are produced in the Willamette Valley of Oregon because it is there that profitable crops of the Ettersburg 121 variety can be produced. The Cuthbert red raspberry has been found the best sort for canning and jam making, and the raspberry-canning

and frozen-packing industry has centered largely in western Oregon and Washington, where the Cuthbert variety is most extensively raised.

Though raised extensively for canning, the Ettersburg 121 strawberry has not been found to be well adapted to other purposes. Partly for this reason and partly because it produces well only in a few areas, it has not occupied an important place in the strawberry industry. A variety adapted to more conditions than the Ettersburg 121 and to other uses than canning would be of greater value. To this end both the Oregon State Experiment Station and the United States Department of Agriculture, by crossing varieties of known canning qualities with other sorts, have originated and introduced excellent canning sorts, the Corvallis and the Redheart, respectively. These varieties, however, are more than just canning sorts. The Corvallis is also an excellent fresh table berry, being one of the highest flavored of all strawberries. The Redheart, too, is an excellent table berry, a good long-distance shipper, and has much wider adaptation than the Ettersburg 121 or the Corvallis, succeeding fairly well even in the Northeast on rich soils.

#### Varieties Introduced in the East

For the region extending from New Jersey to Georgia the Blakemore strawberry has been introduced by the Department of Agriculture both as a general market berry and also as a preserving sort of superior color, texture, flavor, and pectin content. During the winter of 1931-32 cooperating nurseries and the North Carolina Coastal Plain Branch Station at Willard are introducing two other new sorts, the Bellmar and the Southland. The Bellmar is being introduced as a general market sort believed to be superior to the Howard 17 (Premier) for the New Jersey to Maryland region, and the Southland as a home-garden sort of high quality for Southern States.

It is doubtful whether present varieties have all the desirable qualities that might be found in wild berries. Therefore selections of wild berries of all kinds are being made and put under cultivation for comparison and crossing with cultivated varieties. A few years ago an explorer of the Department of Agriculture went into the highlands of the Andes Mountains of South America for a strawberry grown there; another explorer sent back a wild strawberry from Kashmir, northern India; still another found a wild one in Manchuria; and other explorers have sent in strawberries from the tops of the mountains of Taiwan (Formosa) and of the Hawaiian Islands. With the help of forest rangers, selected wild strawberries have been obtained from many parts of the western United States. Through the cooperation of the Oregon State Experiment Station and the United States Forest Service in Alaska many selections of the beach strawberry of the Pacific coast are being used in breeding. Many other persons and agencies have also assisted in collecting superior wild forms. It is hoped that greater resistance to frost and to drought, as well as more vigorous growth through the short days of winter, may be obtained by the use of such wild sorts for breeding. The finest wild blackberries, dewberries, currants, gooseberries, and shadblow (Juneberries or service berries) to be found are also being collected for use in breeding.

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## BIG Trees, Relic of an Ancient Flora, now Found Only in Sierra Nevadas

Relic of an ancient flora, it is now found only in the Sierras in a well defined zone and at an elevation of approximately 5,000 feet. Its cousin, the redwood, *Sequoia sempervirens*, occurs only in a narrow strip along the Pacific coast. These species, confined to California, are the only ones left of a dozen or more which once spread over North America, Europe, and Asia.

Traveling easterly from the great valley of California into the Sierras, one goes from grassy foothills to thickets of brush and oak woodlands, and gradually climbs into the ponderosa pine belt. Above this are the heaviest and most valuable stands of mixed coniferous timber in the Sierras. Big trees like to associate with other Sierra species, and within this zone they occur in isolated groves. Above the foothills the terrain gradually takes on a more definite form with high level ridges and deep sharp canyons. The tributaries of these main canyons, which become less rugged near their heads, often terminate in shallow grassy basins where deep, rich, moist soils prevail. In these sheltered valleys the trees thrive.

The widely separated groves of big trees extend along the west slopes of the Sierras from the Forest Hill Divide group of five living and two down trees in the Tahoe National Forest, to Deer Creek Grove of 300 trees east of Porterville in the Sequoia National Forest. There are in all approximately 70 groves, each containing from 5 to 1,000 trees over 5 feet in diameter breast high. Southerly from the Tahoe group at a distance of 60 miles and opposite Stockton in the San Joaquin Valley lie the North Calaveras and South Calaveras groves containing 158 and 946 big trees, respectively, over 1 foot in diameter, 6 feet above the ground. Forty miles southward in the Yosemite National Park is the Tuolumne grove with 20 trees and the Merced grove with 40. Within another 20 miles is the Mariposa grove with the Speckerman and Fresno groves near by. South 40 miles is the isolated McKinley grove of 160 trees. There is a 15-mile gap between this grove and the Kings River. Between the Kings and Kern Rivers, the big trees are found in greatest abundance; here in a distance of 60 miles there are approximately 50 groves. Here are found Sequoias 25 feet in diameter breast high, containing upwards of 500,000 board feet, and probably more than 3,000 years old. The most imposing big trees are within the General Grant and Sequoia National Parks, the latter containing the best-known grove, the Giant Forest.

### 964 Big Trees Within 415-Acre Area

When the United States acquired the privately owned South Calaveras grove in the Stanislaus National Forest, the Forest Service made a detailed estimate of the pine, fir, and cedar within the area and measured each big tree accurately. In an area of 415 acres there were 964 big trees, 12 inches and over in diameter 6 feet above the ground, and many thickets of reproduction. There is also a heavy intermingling stand of other conifers, young and old.

The largest and tallest big trees are close to Big Tree Creek. The Louis Agassiz, the largest tree in the grove, is 30 feet in diameter at

The big tree, *Sequoia Washingtoniana*, greatest and oldest of living things, grows in the very heart of the beautifully timbered Sierra Nevadas.



FIGURE 5.—The Louis Agassiz, largest of the big trees

ing forest. Towering above all its fellows, the big tree is indeed the king of the world's forest trees.

its base, 23 feet 6 inches in diameter 6 feet above the ground, and 18 feet 1 inch in diameter 19 feet above the ground. Its height is 250 feet. (Fig. 8) The tallest tree in the grove is 330 feet high. The greatest volume of lumber is in the Governor Stoneman tree, which contains 179,000 board feet, or sufficient lumber to build twenty 5-room bungalows. The larger limbs, 100 feet above the ground, are 6 feet in diameter. Big trees occur here singly and in groups of from 2 to 6 and are well distributed over the entire area. Memorial plaques on many of them are reminiscent of botanical and earlier American history.

On entering the big-tree groves one is struck by the massive columns of strength and beauty, the bases fluted to support the great weights; the tapering boles clothed with a soft, cinnamon-red, deeply furrowed bark; and the heavily foliated, bluish green crown lifting itself 100 feet above the surround-

OSCAR EVANS, *Forest Service*.

## BIRD Refuges Can Be Made on Every Farm and Are Valuable

Farmers, more than any other group, will be interested in the establishment and maintenance of effective bird refuges, for the welfare of crops and the commercial success of the farm are intimately related to the numbers and kinds of birds present and to their economic tendencies. Against certain more-or-less injurious species control measures are sometimes necessary; but the great majority of birds are from slightly to almost exclusively beneficial in their relations to the farm, and thus to man. The useful species merit the fullest protection and should be encouraged in every possible way.

The economic value of birds lies chiefly in their destruction of injurious insects. Leading an active life, they require much food and are the most ravenous enemies of insect pests. The various groups of birds differ so much in habits that they feed upon practically all groups of insects; hardly an agricultural pest escapes their attacks. The alfalfa weevil has 50 different bird enemies; the army worm, 43; billbugs, 110; the cotton-boll weevil, 66; the brown-tail moth, 31; chestnut weevils, 85; the chinch bug, 29; clover-root borers, 94; the clover weevil, 48; the codling moth, 36; the cotton worm, 41; cutworms, 98; the forest tent caterpillar, 32; the gypsy moth, 46; houseflies, 49; leaf hoppers,

175; the orchard tent caterpillar, 43; the potato beetle, 34; the rice weevil, 22; the 12-spotted cucumber beetle, 42; white grubs, 95; and wireworms, 205.

In feeding, birds not only take a great variety of insect pests, but frequently destroy them in very large numbers. Often more than 100 individuals are devoured at a meal, and if the insects are small the number sometimes reaches several thousand. It is not surprising that occasionally birds with such appetites entirely destroy certain insects locally. A number of cases are known in which trees, garden crops, and even farm fields have been completely freed of insect pests by birds. On a 200-acre farm in North Carolina it was found that birds were destroying green bugs, or wheat aphids, at the rate of 1,000,000 a day.

A particular farm may not have so large a bird population as is desired, and therefore may not be deriving the benefit from birds that is its due. The most effective means of increasing the number of birds on the farm is protection, and such protection in its best sense is afforded by making the farm a bird refuge.

### Cooperation with Various Agencies

Bird refuges on farms have been most successful when established and maintained on a cooperative plan by the landowner or landowners and a State game commission, an Audubon society, a local bird club, or a school. The owner agrees to the use of the land and acts as warden, and the other party to the contract furnishes and places posters, bird houses, and feeding stations, or even stocks the refuge, as in reservations for game birds. The beneficial effect upon trespass problems of establishing a bird refuge is a great advantage to the farmer. State laws authorizing game wardens to proceed against trespassers on bird reservations greatly increase the effectiveness of private and cooperative bird refuges.

The cooperative bird refuge has been tried in many States as a means of establishing colonies of game birds, such as pheasants, and the plan has invariably proved popular and successful. As a method of protecting insectivorous birds it has been put into practice by schools, local bird clubs, and Audubon societies in New Hampshire, Connecticut, Illinois, and Minnesota, at least, and has been found satisfactory and effective.

It is not meant to imply, by the foregoing, that refuges established by individuals are impracticable—far from it. After all, interest in the welfare of birds is the underlying factor most essential to success, and, that granted, the creation of a refuge on any farm is sure to be attended by some degree of success. The more farms participating in the movement the better it will be not only for birds but for the farms.

In making a bird refuge of a farm, attention should be given primarily to cover, food supply, and water. Modern clean farming leaves slight accommodations for nesting birds. The old-time shrubby fence row or hedge offered food, shelter, and nesting places, compared with which the present-day brushless wire constructions are of no value as attractions to birds. If birds are desired, either some shrubby growth should be permitted along fences, or the deficiency should be made up by planting suitable fruit-producing and other shrubs in gullies, on ditch banks, and in various odd corners.

## Wild Fruits That Birds Like

Planting should always take into account the food-producing qualities of the material used. Among the wild fruits most frequently patronized by birds are elderberry, blackberry, mulberry, dogwood, wild grape, sumac, cherry, holly, blueberry, pokeberry, and service berry. Some of these plants often can be spared in thinning or clearing operations, and most of them can be planted to advantage for ornament as well as for their bird-food value.

Along with the development of clean farming, the character of tree growth on farms has changed; there are not so many old trees as formerly, and in consequence there are fewer sites for the nests of hole-inhabiting birds. This deficiency can be made up by supplying bird boxes, a desirable step anyway if we are to preserve a fair population of the cavity-nesting birds, some of which are among the most useful.

That water for drinking and bathing is required goes without saying, and if the wants of birds in this respect are not filled by natural streams or pools, artificial provision should be made.

Simple ways of meeting the requirements of birds for water, for nesting sites, for shelter, and for food are set forth in a series of Government publications, any of which may be obtained from the Department of Agriculture upon application. These are the following: How to Attract Birds in the Northeastern United States (Farmers' Bulletin 621), How to Attract Birds in the Northwestern United States (Farmers' Bulletin 760), How to Attract Birds in the Middle Atlantic States (Farmers' Bulletin 844), How to Attract Birds in the East Central States (Farmers' Bulletin 912), Homes for Birds (Farmers' Bulletin 1456), Local Bird Refuges (Farmers' Bulletin 1644), and Gourds for Bird Houses and Other Purposes (Leaflet 36). There can also be had from the Bureau of Biological Survey a list of publications, obtainable from other sources, on attracting birds (Bi-159), and a list of dealers in devices for attracting birds (Bi-160).

W. L. McATEE, *Bureau of Biological Survey*

**B**UTTER Stored in 1-Pound Prints Keeps as Well as if Stored in 64-Pound Tubs Butter for storage is usually packed in tubs or boxes which hold about 64 pounds. Circumstances sometimes make it desirable to store the butter in 1 or ¼-pound prints. In this form there is a much greater surface area per unit weight of product than when the butter is in a solid mass.

Observations have been made on the keeping quality and loss in weight of butter stored in 1-pound prints.

In 1928 the Navy Department stored sweet-cream butter in 1-pound prints, wrapped in brine-soaked parchment paper but not placed in cartons. The butter was made by creameries in Minnesota and Wisconsin, shipped to Minneapolis in tubs and there made into 1-pound prints with a power-operated printer. The butter was from 3 to 10 days old when printed. It was then shipped to San Francisco in refrigerator freight cars and placed in storage at about 0° F. In February, when the butter was 7 to 8 months old, it was scored by a competent butter judge. The butter represented 18 churnings from three creameries. One of the churnings scored 91, eight of them 92, and nine of them 93.

For the last eight years a creamery in Pennsylvania has stored 20,000 to 25,000 pounds of print butter annually in a commercial cold-storage warehouse in Washington, D. C. The butter was made from unripened, pasteurized sweet cream and was of very fine quality. It was printed at the creamery with a 1-pound hand printer, placed in dry parchment wrappers and paraffined cartons, and packed in wooden boxes of 50 pounds capacity. It was shipped by express to Washington and stored at a temperature of approximately 0° F. Some of it was held as long as seven months. Upon removal from storage it was sold to people who were accustomed to getting fresh butter from that creamery. A critical examination of the butter showed a slight surface taint but during the eight years that the storage butter has been used the quality has been satisfactory to the consumers. This indicates that the surface taint was so slight that it escaped the consumers' attention.

### Prints Weighed Individually

In order to determine loss in weight during storage nine hundred and fifty 1-pound prints were weighed individually at the creamery and weighed again after six months' storage at 0° F. The butter for this investigation was taken from regular churnings at the creamery, and was printed and packed as described above. It was shipped to a cold-storage warehouse in Washington, D. C., where it was held at about 0° for six months. The loss in weight of individual prints varied from 0 to  $\frac{1}{2}$  ounce. Some of the greater losses were probably due to the presence of unincorporated water, that is, water in large drops which escaped after the first weighing.

The loss in weight was affected but slightly by the position of the print in the case. The outside prints lost, on an average,  $\frac{1}{10}$  ounce per print more than the inside prints.

The manufacturing data at the creamery showed that the butter from three churnings was firm while that from two was soft. The soft butter lost  $\frac{1}{2}$  ounce per pound print more than the firm butter.

Among the nine hundred and fifty 1-pound prints only three lost as much as  $\frac{1}{4}$  ounce. The soft butter lost an average of  $\frac{1}{4}$  ounce and the firm butter  $\frac{1}{8}$  ounce per pound. The average loss for all prints was a trifle less than  $\frac{1}{8}$  ounce per 1-pound print. This is at the rate of nearly 8 ounces on 64 pounds, which is the amount usually allowed for shrinkage when packing 64-pound tubs.

These observations indicate that sweet-cream butter in 1-pound prints may be held in cold storage for at least seven months without material deterioration in flavor and that, when the moisture is well incorporated in the butter, the shrinkage should not exceed  $\frac{1}{8}$  ounce per 1-pound print.

WILLIAM WHITE, *Bureau of Dairy Industry.*

**C**ABBAGE Variety Jersey Queen Adds Early Strain Resistant to Yellows

The yellows disease of cabbage is one of the most hazardous diseases of this crop except in those northern sections such as New York State and northern Wisconsin where the climate is too cool for its development. It is caused by a persistent fungus (*Fusarium conglutinans*), which, when once introduced, remains indefinitely in the soil. The only suc-



FIGURE 9 —The plot of severely infested soil where cabbage selections are tested for resistance to the yellows disease. The two rows at the right were planted with a susceptible variety of cabbage, nearly all plants succumbed to the disease. At the left are two pure lines of Jersey Queen which resisted the disease perfectly.

Successful control of this disease is through the development of varieties of cabbage that resist the parasite. Since 1912 several resistant varieties have been introduced, among which are two late varieties, Wisconsin

Hollander and Wisconsin All Seasons, and three midseason varieties, Marion Market, Globe, and All Head Select.

Until recently a resistant strain of early-maturing type has not been available. However, there has now been perfected a resistant strain from the Early Jersey Wakefield variety, which is popular as an early-market and home-garden cabbage. To distinguish this new strain from the mother variety it has been named Jersey Queen.

Jersey Wakefield is very susceptible to yellows. In badly diseased soil 95 per cent of the plants commonly succumb. It was from the small percentage of survivors that the new variety, Jersey Queen, was developed. By selection from such survivors and reselection over a period of years were developed pure lines which completely withstood the disease on soil so



FIGURE 10 —A mature head of Jersey Queen cabbage. The shape of head is similar in every respect to that of the mother variety, Jersey Wakefield.

severely infested with the yellows parasite that most plants of a susceptible variety succumbed. (Fig. 9.) From these pure lines many plants were eliminated because of their failure to correspond closely to the Jersey Wakefield in earliness, type of head, and other characters. One of these pure lines was chosen after three years of close comparison with the mother variety. This line was made the basis for multiplication.

The new variety is very similar in type to the better strains of Jersey Wakefield, with which it has been compared. It matures just as early and as uniformly as the earliest strains of the mother variety. The average weight per head is equal to that of the early strains of Jersey Wakefield. The characteristic pointed head is maintained (fig. 10), and the core is inclined to be somewhat shorter.

Seed of this new variety is now being made available through the seed trade. Inquiries regarding sources of supply may be directed to the Department of Agriculture.

J. C. WALKER, *Bureau of Plant Industry.*

## CAMPS in the National Forests Attract Farm Folk Seeking Recreation

Increasing use of the conveniently located national forests of Oregon and Washington is being made by people from the agricultural lands of the interior where summer temperatures make the lowlands uncomfortable. Summer sun on fallow and stubble, quivering heat on orchard and field, are more bearable when an ever-extending road system makes it possible to reach the forest-bordered streams or lakes of the national forests within a few hours.

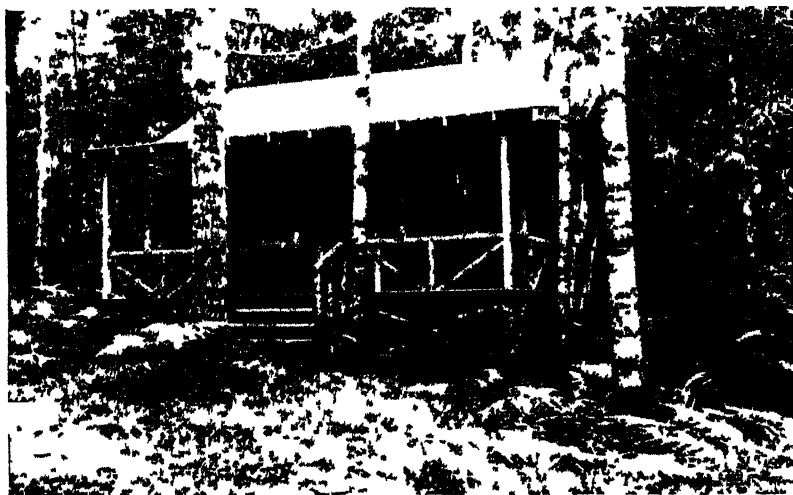


FIGURE 11 —An attractive and inexpensive summer home in an Oregon national forest

The Forest Service has anticipated this recreational use and has carefully planned for it by setting aside tracts of land along streams, lakes, and highways for the use of the public. Each person can find somewhere within reach of his home a place in the national forests which will exactly meet his need as a refuge from summer heat. He

may wish to put up his tent on one of the many free public camp grounds, where wood and water are to be had for the taking. He may desire to live at one of the many resorts, a cabin camp, or a hotel. He may wish to secure a permit and build a cabin where he can be alone, or perhaps the younger members of the family may join one of the numerous organizations which operate summer camps on the national forests. (Fig. 11)

The free public camp grounds meet the greatest demand since their use involves a minimum of effort and expense. In fact, the only cost is that of getting to the camp and back home. Restrictions are few, pertaining only to fire and sanitation. These free camp grounds are laid out in desirable locations, and in many cases simple improvements such as water systems, cheap tables, and sanitary conveniences are provided. If actual use may be taken as a measure of their service, these national-forest camps are filling a clearly expressed need as refuges from the dusty heat of the lower farming lands.

F. V. HORTON, *Forest Service.*

**CATTLE-DIPPING Vats of Octagonal Shape Meet with Success in Nevada** Constructed first as an experiment, an octagonal cattle-dipping vat, built in Elko County, Nev., during 1931, proved so successful that stockmen of the county promptly built several more vats of the same type. The dipping vat customarily used in eradicating cattle scabies

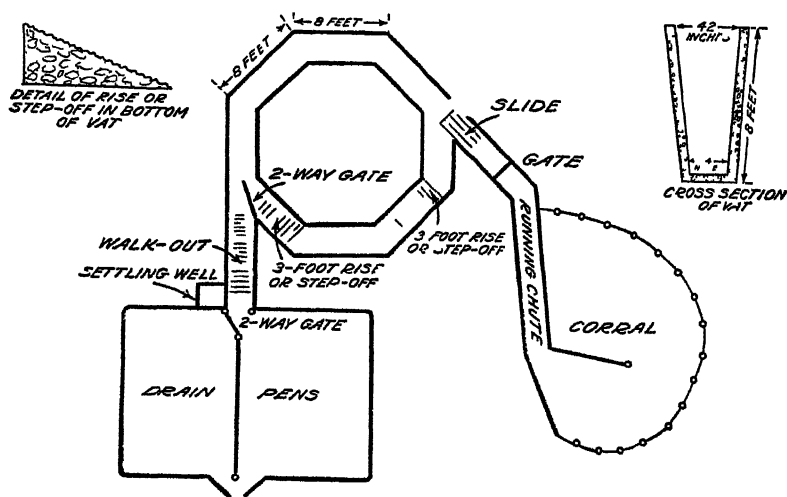


FIGURE 12—Plan of octagonal dipping vat

and several other parasitic diseases of livestock is a long trench or trough commonly built of concrete, wood, or metal, containing a medicated solution through which animals are made to swim. The movement of animals through the vat is controlled by men stationed at the sides of the vat, who operate gates and also push each animal entirely under the surface at least once, so that the solution may reach parasites on the head as well as on other parts of the body.

The octagonal type of vat, though more expensive to build than a straight one, has proved to possess several advantages that more than offset the additional construction cost when large numbers of animals are to be dipped. The main points of superiority are: (1) The dipping operation is more thorough; (2) it is almost automatic; (3) it is easier on the cattle than the old method; and (4) it permits a larger number of cattle to be dipped without the vat being recharged with fresh solution.

The octagonal vat consists of an 8-sided trench made preferably of concrete and so arranged that the animal must swim around for the required time of dipping, usually two minutes, before being released.



FIGURE 13—General view of the drain pens, dipping vat, and corrals

In this way the usual fretting caused by the necessary waiting in a straight-trench vat is prevented. A submerged ledge at the entrance causes each animal to duck itself on entering the vat and two other step-offs or drops (fig. 12) automatically give additional duckings. The outside circumference of the octagonal vat here described and illustrated is 64 feet, and the dip capacity is approximately 5,000 gallons. Such a vat will hold 8 mature cattle or 10 yearlings at one time. As many as 180 cattle have been dipped in an hour, and in one instance 819 cattle were dipped in five hours. Since several hundred thousand dippings are frequently necessary in eradicating cattle scabies from a single county, large-scale equipment materially expedites the work. The octagonal vat is not recommended, however, when fewer than 3,000 head of cattle are to be dipped.

#### Dipping Cattle Affected with Scabies

The new type of vat is especially convenient in dipping cattle seriously affected with scabies. Such animals should be immersed about four minutes. When this length of immersion is necessary, the exit gate is kept closed until the animals have made enough trips around the vat for the required time to elapse. The gate is then opened and the animals enter the walkout which leads to the drain pen. (Figs. 13 and 14)

The cost of an octagonal vat, including a steam boiler for heating the dipping solution, has ranged from \$1,500 to \$1,800. With one exception these figures represent contract jobs and in most cases include corrals for holding the cattle before and after dipping.

An unusual feature of one vat is that the dipping fluid was heated with spring water warmed by an extinct geyser. A 2-inch pipe leading from the spring extends around the vat a few inches from the bottom,

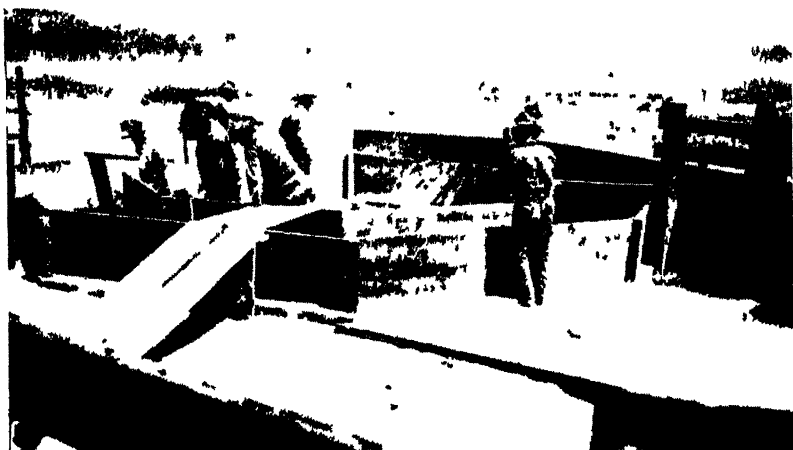


FIGURE 14.—An octagonal dipping vat in operation. The attendants need only to keep the animals moving while they are in the vat

carrying water with a temperature of 128° F. This temperature is sufficient to maintain the dipping fluid at the desired uniform temperature of 102°. This method of heating the fluid saved the cost of a heating plant and the cost of fuel for heating the fluid during each operation.

L. C. BUTTERFIELD, *Bureau of Animal Industry.*

**C**CHEESE Production Is Still Largely Confined to a Few Areas in U. S. Cheese production in the United States, like the production of many other agricultural products, is very largely confined to certain definite areas. In these areas it appears that the climate, soil, and other natural advantages, including the inclinations of the agricultural producers, are especially favorable to cheese production. Originally the cheese industry was localized in New York, Wisconsin, and Ohio. New York became famous for the flat and twin styles of American Cheddar cheese which to-day are referred to as "State Flats" and "State Twins" in many of the country's leading cheese markets. The Swiss-cheese industry has been extensively developed in Green County, Wis., and in parts of Ohio, with the result that Monroe, Wis., is known far and wide as the "Swiss cheese capital" of the United States. Brick and Limburger cheese factories were located in Dodge County, Wis., whereas the eastern, southwestern, and northwestern counties of that State produced principally an American Cheddar type of cheese. In recent years production of various Italian varieties of cheese has developed in California, whereas New York has continued to be the leading State in production of cream and Neufchatel cheese.

Generally speaking, the production area of the so-called foreign types of cheese, especially Swiss, Limburger, and the Italian varieties, has always been more limited than has the American Cheddar cheese territory, principally because of the factor of nationality and the methods of production. Consumers of these cheeses desire a flavor in the domestic product which is closely comparable to that of the imported variety. For that reason, cheesemakers are commonly employed who have knowledge of the methods of manufacture used in a foreign country that produces a particular type of cheese. The manufacturing processes of certain foreign types of cheese are often complicated and the makers must be naturally adapted or have the ability and patience to produce the particular type of cheese. For these reasons the production of most foreign types of cheese has in the past been limited largely to communities where the people were chiefly of one nationality.

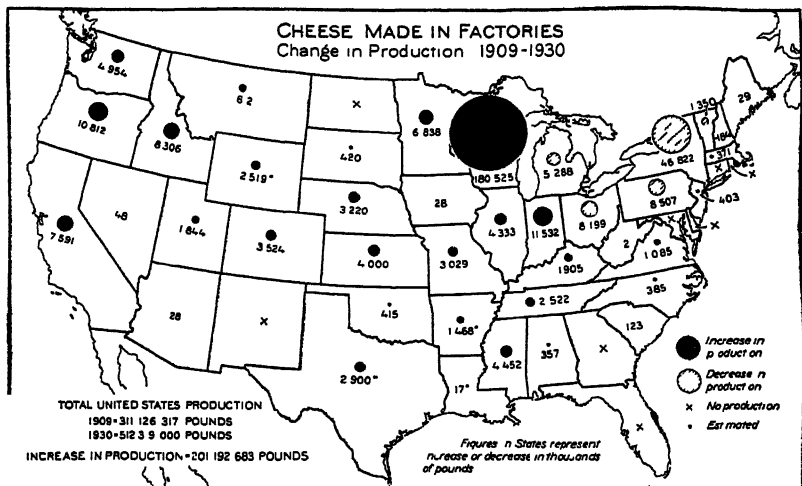


FIGURE 15—Increases and decreases in manufacture of cheese in different States

### Shift in Producing Areas

The rapid growth of the large industrial centers in the East brought about an increased demand for milk for fluid consumption, and as producers were able to realize a greater return from milk sold for fluid use than for milk delivered to the cheese factory, a shift occurred in the cheese-producing areas. The migration of cheese producers from New York and other Eastern States to the Middle West further contributed to this movement. New York became less important and Wisconsin gained in importance as a cheese-producing State. Dairymen on the Pacific coast realized that because of abundant pastureage and forage crops, favorable climatic conditions, and higher transportation costs on cheese shipped from the East and Middle West, there was an opportunity for cheese production in the West; consequently California and Oregon became important cheese-producing States toward the close of the nineteenth century.

With the trend of cheese production away from the territory around the large cities (fig. 15), decreases in production occurred in New York,

Pennsylvania, and other Eastern States. Michigan became less important as a cheese State as the automobile industry developed and the manufacturing cities in the eastern part of the State required the milk from the cheese areas for market-milk purposes. In Wisconsin, also, cheese production shifted toward the northern part of the State and away from the large cities at the foot of Lake Michigan. On the Pacific coast, the cheese industry expanded rapidly in California during the period 1910-1920, but since 1920 production has barely held steady, because rapidly increasing quantities of fluid milk were needed for city consumption.

Another shift in cheese production that occurred during the last four years, and one of prime importance in so far as the industry as a whole is concerned, was in the South and Southwest. The diversification of farm crops, the eradication of the cattle tick, and the ravages of insect pests in cotton were among the factors that contributed to the pro-

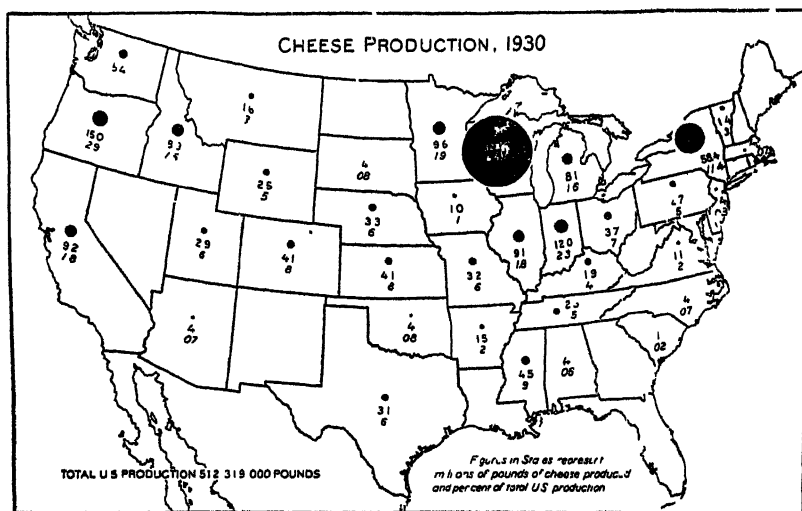


FIGURE 16.—Manufacture of cheese in different States in 1930

duction of nearly 24,000,000 pounds of cheese in 1930 in 19 States of the South and Southwest. As late as 1927 cheese production in southern territory was of minor consequence. The home market in the South has enabled the southern producer to compete quite successfully with the northern producer, with the result that much of the Wisconsin cheese that was formerly consumed in the South, especially during the cotton-picking season, must now find other markets.

#### Wisconsin and New York Still Lead

Despite recent changes in the cheese-producing areas, Wisconsin and New York are still the leading cheese-producing States. (Fig. 16.) The former State continues as the leading producer of American Cheddar, Swiss, Brick, and Limburger, whereas the latter not only ranks second in American Cheddar cheese production, but also is the principal producer of Cream and Neufchatel cheese. The Italian varieties are produced chiefly in California.

Per capita consumption of cheese in 1930 reached the high point of 4.7 pounds, which exceeded the previous high record of 4.6 pounds reached in 1929. An almost steady gain in per capita cheese consumption is registered since 1917 when, because of war conditions, total cheese consumption declined very materially because many potential consumers were abroad, engaged in war activities. Therefore the decline in per capita consumption from over 3.5 pounds in 1914 to 2.9 pounds in 1917, was not truly representative.

The increase in per capita consumption of cheese during the last 20 years may be attributed to a number of factors, among which are more extensive advertising of the food value and use of cheese, the adjustment of cheese quality to meet consumer demand, more convenient packaging, and the increased use of cheese in the various so-called cheese specialties. Among the more important new developments in the manufacture and marketing of cheese during the last two decades must be mentioned the production of process cheese about 11 years ago, the development of artificially refrigerated curing rooms and with it more scientific curing methods, and the invention of means for marketing natural cheese in packages more convenient to the retailer.

W. J. VENSKE, *Bureau of Agricultural Economics.*

**CHESTNUT Lands Planted to Pine Stands Become Valuable in Northeast** Before the chestnut blight spread through the forests, magnificent pure stands of chestnut were frequent in the Northeastern States.

Little chestnut now remains, save dead trees and young sprouts which are persistently put forth, only to succumb to the disease. Rehabilitation of such blight-killed areas is an important forestry problem, especially where other valuable species to seed in the spaces left by the chestnut are lacking.

Studies made by the Northeastern Forest Experiment Station in cooperation with the Massachusetts State College show that although natural replacement is adequate on these blight-killed areas, the best way to restore them to full growing capacity is to plant the bare spots with a high-grade timber species such as northern white pine. Since 1924 three permanent sample plots have been maintained on typical blight-killed chestnut land at Sunderland, Mass. Two plots are located where northern white pine was planted in 1919 when the dead chestnut trees were removed. On the third plot no planting has been done and the dead chestnut trees are still standing.

In 1929, 10 years after planting, the plots clearly showed the advantages of artificial over natural replacement. All the plots are now entirely covered with young growth—the planted plots have approximately 1,000 trees an acre, and the natural plot 810 trees to the acre. But the present stand on the planted areas is composed almost exclusively of the commercially valuable northern white pine, while on the naturally restocked area more than 50 per cent of the trees are of such commercially valueless species as red maple, moosewood, and witch-hazel. In effect, on the planted plots potential brush land of low value has been converted in less than a decade into a young stand of high economic importance.

However, in converting cut-over chestnut areas to conifer stands, the sprout growth is a serious obstacle. The competition for soil nutri-

ments and moisture by the live stumps and the competition for light and crown space by the relatively faster-growing hardwood sprouts, interfere with the development of young conifers. On one of the two planted areas, weeding was practiced. Where the hardwood sprouts have been checked the pine canopy overtops that of the sprouts by about 3 feet. Where no weeding was done the conifers are overtopped by practically the same distance. On the weeded plot, 70 per cent of the pines have their crowns entirely free, whereas on the unweeded area only 50 per cent escape partial or total suppression.

Where the planted stock is small and the chestnut sprouts are tall, weeding prevents early suppression and frequently the death of planted trees. Thus the time required for the next timber crop to reach merchantable size is shortened and there is an earlier return on the investment. It is recommended that the first weeding take all the hardwood sprouts. Subsequently, less desirable seedlings can be removed to release enough selected individual trees to form a mature stand of highest grade timber.

PAUL W. STICKEL, *Forest Service.*

**C**HICK Leg Weakness May Be Prevented by Special Attention to the Feed When chicks are reared in strict confinement, two types of leg weakness, caused by incompleteness in the diet, may occur. One of these, more correctly called rickets, is caused by a deficiency of vitamin D in the diet. The other type, known as nutritional perosis, or deforming leg weakness (fig. 17), is very probably caused by a dietary deficiency which, as yet, is not well characterized.



FIGURE 17—Typical positions of chickens affected with nutritional perosis

When a chick is suffering from rickets, the bones of the legs become thickened and soft and the percentages of calcium and inorganic phosphorus in the blood serum are markedly decreased. This condition can be prevented by adding from 1 to 2 per cent of cod-liver oil to the diet.

Although cod-liver oil is very effective in preventing rickets, it appears to be of no value as a preventive of perosis. In fact, the writer's experience has been that perosis is not likely to occur when some diets are fed, unless they do contain either cod-liver oil or some other source of vitamin D. The ash content of the bones and the calcium and inorganic phosphorus content of the blood serum are not altered in chicks afflicted with perosis, and this fact distinguishes perosis from rickets.

The first symptoms of perosis are a slight puffiness of hock joints and a marked tendency on the part of the chicks to rest for long periods of

time in a squatting position. Within a few days the joints become noticeably enlarged, and sometimes the skin covering them has a bluish green cast caused by small hemorrhages in the underlying tissues. This stage in the development of perosis has been called "enlarged hocks" and "hock disease." This seems to be the turning point in the development of this condition, since in some cases, especially among White Leghorns, the chicks may recover to such an extent that there is scarcely any noticeable permanent deformity.

### Bending of the Lower Bones

Almost simultaneously with the hock joints becoming enlarged, the two lower bones of the legs, especially the one to which the toes are attached, show a slight bending which is very readily apparent when the chicks are X rayed. As the condition develops, these bones become more and more curved until gross deformity results. This stage has been referred to as "deformed leg bones." Frequently, in severe cases, the joint cartilage slips a little at the lower end of the second bone and the main tendon slips from its place, leaving the hock joint permanently disabled. This stage has been frequently called "slipped tendon."

Various workers have suggested that nutritional perosis is caused by feeding an excess of mineral matter, particularly bone meal. Although it appears to be true that excess mineral matter may have a tendency to aggravate the condition, experiments conducted at the United States Animal Husbandry Experiment Farm, Beltsville, Md., clearly indicate that a mere excess of mineral matter does not cause perosis to develop. These experiments have further shown that the relative amounts of calcium and phosphorus in the diet are very important. They also seem to indicate that rice bran is of considerable value in preventing nutritional perosis. By adding about 10 per cent of rice bran to two widely different types of diet which had caused the condition to develop, and simultaneously adjusting their calcium-phosphorus ratio to approximately 2.5:1, it has been possible to rear a number of groups of chicks without the occurrence of a single case of perosis.

In the typical diet consisting of corn meal, wheat or wheat by-products, dried milk, and meat scrap, the addition of 2 per cent of finely ground limestone will give a calcium-phosphorus ratio very close to the desired value.

HARRY W. TITUS, *Bureau of Animal Industry.*

**C**HINA'S Demand Large  
for Some U. S. Products,  
Despite Low Incomes

An American farmer traveling into the interior of China, and walking across the countryside on the paths that connect the innumerable vil-

lages, is at once impressed with the great number of people on every hand—in the fields, in the farm huts, in the villages, and in the shops—and with the meager living standards, if not the poverty, of the masses. Not much purchasing power is evident. Individually, it is very small. But a number of foreign wares touch the lives of these people and the small individual demand totals to a surprising volume if any substantial part of the vast population is reached. Various conditions have brought about a significant demand for certain Amer-

ican farm products, the principal items being cotton and flue-cured tobacco from the South, wheat flour from the Pacific Northwest, and fresh fruits from the Pacific coast.

### Cotton

In recent years cotton has taken the leading place among these products. Prior to the World War a modern spinning industry was



FIGURE 18.—Home spinning continues to be a common practice in China

only partly developed in China but the war stimulated a rapid expansion and now after a rather stationary period of seven years the industry is again expanding. To-day China has approximately 4,000,000 spindles and, instead of importing cotton yarn heavily, as was the case before the war, has a small net export trade. In spite of this growing spinning industry, home spinning is still extensive.



FIGURE 19.—A cotton-goods hawker in Honan Province carries his stock of piece goods on a wheelbarrow

For its spinning industry, China is only partly dependent on foreign cotton, since the bulk of consumption is of Chinese growth from a commercial crop of more than 2,000,000 bales and from a farm crop of around 3,000,000 bales annually. Most Chinese cotton ranges

from  $\frac{5}{8}$  to  $\frac{3}{4}$  inch in staple length, and is distinctly inferior to American cotton in that regard, but some areas of China produce  $\frac{3}{4}$  to  $3\frac{1}{2}$  inch staple. Except in years of abnormally low prices in the United States, such as 1926 and 1931, American cotton is not used in competition with the shorter Chinese cotton in spinning lower than 20-count yarn. Un-

til the present time the spinning of higher count yarns has been done largely in Japanese-owned mills which represent about one-third of the total spindles of China, and consumption of American cotton has been largely by these Japanese mills. But there is an evident tendency on the part of Chinese mills to spin higher counts and to use some American growth in mixtures for 20-count yarn. Imports from the United States during the 1930 crop year reached 450,000 bales. Higher tariffs on cotton piece goods, particularly those levied in a measure that became effective January 1, 1931, have stimulated the weaving industry. As this industry grows, more and more of the longer-staple cotton will be needed. Certain districts in China, already growing staple that competes with American cotton, are capable of a larger production, but this development is contingent upon improvements in transportation and marketing, and upon political conditions.

### Cigarettes

The cigarette business in China, with which the United States leaf trade is associated, depends for its volume upon low price per unit and upon thorough distribution. With no other essentially foreign article has it been possible to keep the price per unit down so low that an appeal can be made to the masses in a population variously estimated at 250,000,000 to 400,000,000. With few other foreign articles has there been such a thorough distribution. The bulk of sales consists of cigarettes that sell to dealers at 10 or more for 1 cent. Many of the retail sales consist of single cigarettes. It is a common sight to see a coolie buy two cigarettes, place one behind his ear for later use, and leisurely smoke the other; or he may save his first cigarette when it is half used. Even such low prices are prohibitive for millions of Chinese, especially in distant places where heavy transportation charges must be added or where taxation is excessive. Prices per unit must be maintained at an incredibly low level in order to secure a volume of business.

But aggregate consumption is tremendous, for cigarettes go into the far corners of this extensive and populous republic. Cigarette peddlers and shops handling cigarettes seem to occur wherever there are streams of traffic or groups of workers. Annual sales in 1930 and 1931 probably exceeded 1,200,000 cases of 50,000 cigarettes each. Political disturbances, irregular taxation, and many difficulties during past years have tested and established the strength of the demand for cigarettes in China. In spite of difficulties, consumption increases. The



FIGURE 20—A typical cigarette stand on a street of a Chinese city

considerable replacement of native forms of smoking by cigarettes is chiefly the result of enterprising and resourceful sales promotion and advertising methods by foreign and Chinese companies.

In many foreign countries, habits and tastes have been adapted to domestic tobacco, but in China there has developed such an exclusive preference for cigarettes from American flue-cured tobacco, introduced by foreign companies, that quality in cigarettes is measured in terms of quality of American flue-cured leaf used in their manufacture. With increased cigarette consumption, however, has come a domestic flue-cured tobacco industry that also forms a source of leaf supplies. Foreign companies selected three areas in which the growing of flue-cured tobacco from American seed was introduced, taught, and promoted. Production has changed from year to year, depending considerably on the price paid and the buying activity of foreign companies, but recently low silver exchange has made it necessary for these companies to use more and more domestic leaf. Domestic production in 1931 was approximately 100,000,000 pounds. In general the quality is much inferior to American leaf, as the tobacco is lacking in body and aroma, but when mixed with various quantities of American leaf it must serve in the cheaper brands of cigarettes. The average price paid to growers for the 1931 crop is reported as equivalent to 4 cents a pound. American leaf supplemented local production to the extent of 128,000,000 pounds in 1929 and 144,000,000 pounds in the 1930 crop year.

#### Wheat and Flour

To sell wheat to China may seem like selling coal to Newcastle since China's annual wheat production is probably more than 800,000,000

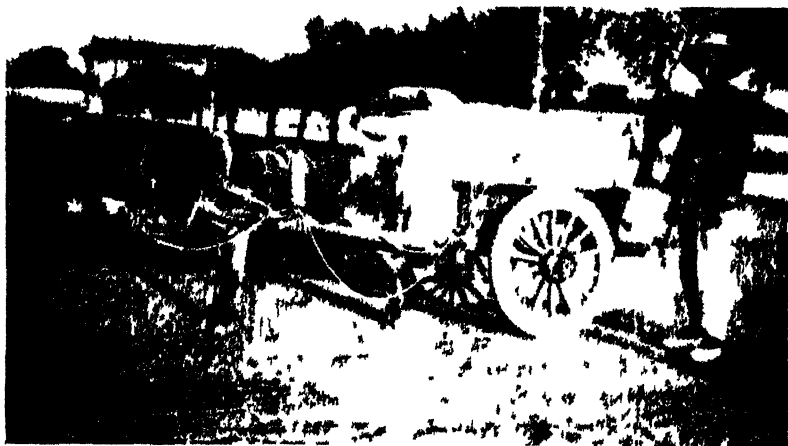


FIGURE 21 — American flour being distributed in the ancient city of Peiping, China

bushels and exceeds our own production, but to a surprising degree population has caught up with the crop production, and surpluses, if any, are small. Then, too, over much of China, lack of railways and lack of cheap transportation facilities limit the movement of grain to distant markets. Famines may occur in Provinces almost adjacent to those having good wheat crops. For certain deficit districts along the coast it is simpler and more economical to import foreign wheat and

flour. In north China wheat is as standard a cereal in the diet as is rice in central and south China. The milling industry in Shanghai, which exports most of its output to ports in north and south China, buys significant quantities of foreign wheat when low grades and exchange rates permit it to buy to advantage, but it is not a consistent user of American wheat. A number of ports in north China are substantial markets for flour from Shanghai, the United States, Canada, and Japan.

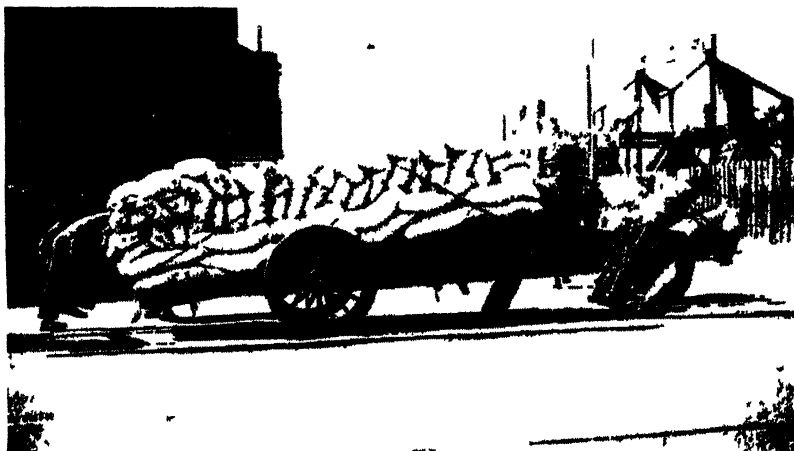


FIGURE 22—Moving lots of American flour at Tientsin, China

Takings from our Pacific Northwest mills seem to be determined by the size of the wheat crop in the Tientsin area, mill operations in Shanghai, and comparative prices. Imports reached the highest figure in 1929 when imports of American flour for all China were 3,300,000 barrels. Not much foreign flour, however, penetrates far from the port cities and our trade is chiefly confined to spots on the coast or to near-by accessible places. Foreign wheat and flour merely touch the fringes of the country and of its food supply.

#### Other Items

Special aspects of other items in our export trade may be briefly mentioned. American condensed and evaporated milk continues to grow in popularity as food for babies, but the Chinese generally consider these products as medicine rather than as food. Raisins have found a limited place in the Chinese diet and confections, where other dried fruits have failed almost completely. Domestic oranges of many varieties fully deserve their popularity in China but the all-season character of American varieties enables the wealthy Chinese in Shanghai and other port cities to enjoy this fruit during the spring and summer months when Chinese oranges are not on the market. American canned fruits from California are so prized as to be used as gifts at the Chinese New Year celebrations.

#### Low Silver Exchange Cuts Buying Power

No appraisal of market demands in China can be made without considering the far-reaching effect of the depreciation of silver and with it

the depreciation of the currency of China. Prior to the World War, silver and gold had a relatively stable relationship, but since 1914 silver has gone through a cycle of excessively high and excessively low extremes. Absolute exchange values over a period of years are not so important as reasonable stability. Exchange rates over a 4-year period prior to 1930 were somewhat constant, with the Chinese silver dollar equivalent to 45 cents American currency. In late 1929, however, silver followed the course of commodity prices and during the latter half of 1931 the Chinese dollar was worth less than 25 cents or about one-half of its value in 1928 and 1929. This exchange situation has the same effect as would the doubling of the silver price for foreign goods if the United States price remained stationary. United States prices have dropped but unless the reduction is 50 per cent or more the silver price in China is higher than it was. Chinese wages and domestic price levels have not followed the exchange rate and probably will do so only very slowly, so the depreciation of silver practically represents a corresponding reduction in purchasing power.

Many complications result from this situation. The possibility of an outlet which low prices for certain farm products might create in China has been offset by the exchange rate. High prices in Chinese currency have made many foreign products almost prohibitive. A rise in silver value and in silver exchange would be a helpful development in restoring Chinese purchasing power.

PAUL O. NYHUS, *Bureau of Agricultural Economics.*

## CITRUS Fruit Coloring by Ethylene Process Much Improved Lately

Some of the early or fall varieties of oranges and grapefruit ripen while the fruit is still green in color. Later varieties that mature in the spring or summer assume the color of full maturity during the winter while the fruit is still immature, but when warm spring weather occurs the rind may turn green again. Thus while the edible part of the fruit ripens there is a "regreening" of the rind. Grapefruit growing on the inside of densely foliated trees never develops full color, although some of the best-flavored fruit is produced there. There is, therefore, no definite relation between flavor or maturity and the color of the fruit while on the tree. However, there is a very significant relation between the color of the fruit offered for sale and the price that it will bring, and citrus fruit producers have always faced the problem of making the color of ripe fruit match its flavor.

The orange and yellow pigments are located deep in the rind and remain masked so long as there is any green color in the outer rind. After the fruit is picked there is a slow loss of green through natural processes, but under commercial conditions it has become necessary to color the fruit more rapidly without changing its natural flavor.

Various methods of coloring the fruit, such as subjecting it to the exhaust fumes of a gasoline engine or to the pungent fumes arising from the incomplete combustion of kerosene, have been used. Under favorable conditions fruit could be colored by these methods in a few days. However, there was always danger to human life when the gasoline-engine exhaust fumes were confined in the coloring rooms, and the kerosene fumes sometimes imparted a disagreeable flavor to the fruit. In addition, the latter involved a considerable fire hazard and often caused serious property loss.

## Commercial Ethylene Now Used

When it was discovered that ethylene gas is the essential component of kerosene fumes so far as coloring the fruit is concerned, methods were devised whereby commercial ethylene was substituted for kerosene fumes in the coloring process.

Besides the concentration and kind of the gas which is the active agent, other factors upon which coloring depends have been found to be the temperature, humidity, and ventilation of the coloring room. All these factors are influenced by the type of construction, arrangement, and equipment of the room.

Loosely constructed and uninsulated rooms can be used during warm weather, provided the rooms are ventilated frequently, but when artificial heat must be supplied great difficulty is encountered. Unless a uniform temperature can be maintained throughout the room there will be a lack of uniformity in the rate of coloring and it may be necessary to treat some of the fruit for excessively long periods. It is essential to shorten the coloring process as much as possible, because the high temperatures and humidities required are very favorable to the development of stem-end rot and other types of decay.

The greatest practical progress in the development of improved coloring practices has been made since 1929. At that time the Mediterranean fruit-fly outbreak in Florida necessitated the construction of a large number of well-insulated rooms especially equipped for air conditioning in order to maintain the fruit under uniform conditions during treatment for this pest. Rooms of this type proved to be admirably adapted for coloring purposes and have now very largely supplanted the earlier kinds throughout Florida. (Fig. 23.)

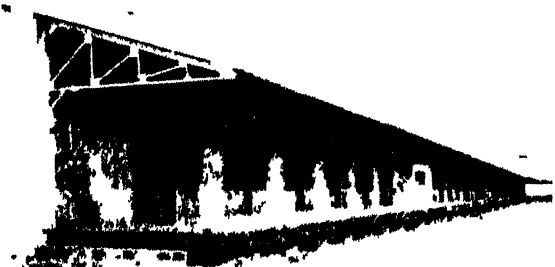


FIGURE 23.—Receiving platform of a Florida citrus packing house showing doors to coloring rooms in which the fruit is placed as soon as received. Packing houses are usually arranged so that the fruit can be moved in a straight line from the coloring room through the packing space and into cooling rooms on the opposite side of the building, whence it is loaded directly into refrigerator cars.

## Equipment of Coloring Rooms

These coloring rooms are usually rectangular in shape, with the ceiling 7 or 8 feet above a slatted floor supported on 2 by 6's placed over a tight subfloor. Such a floor is essential for good air circulation. Powerful blowers are placed along the side wall or above the ceiling to draw the air from beneath the floor and through a duct to the blowing apparatus, where it is brought to the desired temperature and humidity and where the coloring gas is introduced before the air and gas are forced down through the fruit. (Fig. 24.) The multivane type of blower rather than the propeller type has proved most satisfactory. The blower is equipped with an adjustable opening on the suction side to permit continuous introduction of fresh air and to prevent excessive

concentration of carbon dioxide and other waste gases within the room. In this manner the air in the coloring room is continuously recirculated and uniform conditions are maintained throughout. In a room of 1-carload capacity an actual delivery of at least 2,000 cubic feet of air per minute is desirable.

During cold weather the air is heated by being passed over a large steam radiator and is humidified by steam introduced from a small jet. During warm weather the condition of the air is regulated by passing it through a water spray which absorbs excess heat and raises the humidity. The temperature is controlled by an automatic thermostat to prevent the fruit from becoming overheated during the coloring period.

The ethylene gas is introduced and regulated by two reducing valves attached to the high-pressure cylinder in which it is purchased. The gas is usually released at a pressure of only a fraction of a pound and is conducted through a  $\frac{1}{4}$ -inch main-line pipe with laterals leading into

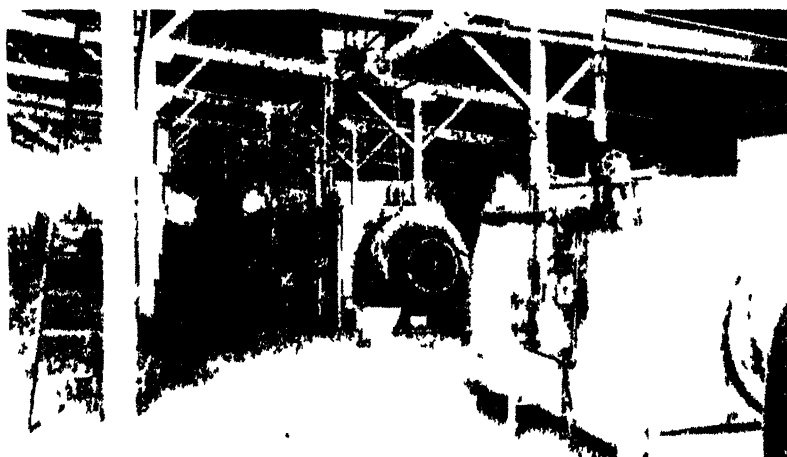


FIGURE 24.—Air-conditioning equipment above ceiling of coloring rooms, showing fans, steam and water pipes, and ethylene gas line

the air-conditioning chamber of each coloring room. At the discharge end of each lateral pipe there is a nozzle with a cut-off to enable one to turn the gas on or off in a given room without affecting the operation of other rooms. The gas is turned on when the room is filled with the fruit and is left on until the coloring is completed. Being thoroughly mixed with the air before its introduction into the coloring room, it is supplied in uniform concentration at all times. It is most satisfactorily used at a rate of about 3 cubic feet per day per room of 1-carload capacity.

#### Varying Reactions in Different Crops

Experience has shown that few citrus crops react alike to the coloring process, since growing conditions have a marked influence on the rate of coloring. Variable weather conditions and variations in the condition of the fruit itself from time to time, prevent adoption of a standardized coloring procedure. In general, however, it is recommended that the temperature of the fruit should be brought to 80° to 85° F. within two

or three hours if possible. To accomplish this it is sometimes necessary to use live steam, which also brings up the humidity and prevents wilting of the fruit. It is desirable to maintain the relative humidity within the range of 80 to 92 per cent, using the higher humidity at the start of the process. Care must be taken, however, to prevent the fruit from remaining wet for prolonged periods. After the fruit is brought to the desired temperature, live steam in the coloring room can be dispensed with and the desired humidity can be maintained by manipulating the air-conditioning equipment already described.

Ventilation should be provided during the entire coloring period by keeping the fresh-air vent in the air mixer open continuously. The size of the opening necessarily differs with the size and tightness of the room. Usually an opening of 6 to 8 square inches is adequate for a coloring space of 2,200 cubic feet.

Coloring is but one step in handling the fruit from grove to market. It must be coordinated with other essential operations, in all of which one cardinal principle should be emphasized—the maintenance of maximum speed consistent with careful handling, so that the fruit may be packed and cooled without delay.

J. R. WINSTON, *Bureau of Plant Industry.*

## COTTAGE-CHEESE Industry Could Be Expanded with Advantage in Some Areas

Before 1917 cottage cheese did not have the commercial importance that it has to-day. It had been made both in the home and by some dairy plants in various sections. The manufacturing methods commonly used, however, were such that the product was of nonuniform quality and did not create an extensive demand. Nor was any considerable volume of skim milk utilized in its manufacture.

Not until during the World War, when conservation of food and utilization of all food products became a question of economic importance, was there any concerted effort to improve manufacturing methods and to utilize large amounts of skim milk in the manufacture of cottage cheese. At that time, although large quantities of skim milk were being fed to livestock on the farm, millions of pounds were also being poured into creamery and milk-plant sewers. To utilize this waste as a human food the United States Department of Agriculture in 1917-18 inaugurated an intensive campaign to increase the manufacture and consumption of cottage cheese. Many creameries and milk plants throughout the dairy sections of the country took up its manufacture on a commercial scale. This may be said to be the real beginning of the cottage-cheese industry, for since that time its production has increased steadily.

Throughout the campaign cottage cheese was widely advertised in newspapers and on Government posters placed in restaurants, markets, and other public places. The Department of Agriculture also published information on the food value of cottage cheese and developed new methods by which it could be served as a human food in different combinations. The department realized that in order to increase the consumption of cottage cheese it would be necessary for the manufacturers to put a good product of uniform quality on the market. To accomplish this a standardized method of manufacturing was adopted

and especially trained men were assigned to different sections of the country to work with creameries and milk plants. Practical demonstrations of the method of manufacturing were given at each plant until a satisfactory and uniform quality of cheese was being produced. This introductory work, which was a part of the campaign, stimulated a new and increasing demand for cottage cheese. The manufacturers lost no time in putting a good-quality product on the market. Since that time there has been a steady increase in the annual production of cottage cheese, including pot and baker's, until by 1930 the amount manufactured was 240 per cent greater than in 1918.

According to estimates of the Bureau of Agricultural Economics of the Department of Agriculture, in 1918, the first year for which production figures were available, 28,350,000 pounds of cottage cheese, including pot and baker's, was manufactured. In 1922 the total was 32,389,000 pounds, in 1926 it was 67,977,000 pounds, and in 1930 it was 97,641,000 pounds. The amount of cottage cheese made in 1930 represents 644,430,600 pounds of skim milk, and, at the average price received by the manufacturer for plain cottage cheese, the value of the 1930 production was approximately \$6,000,000.

In 1930, 598,008,000 pounds of cheese of all varieties was manufactured in this country. These varieties represent eight different classes and rank in volume of production as follows: (1) Cheddar, which represents 64.6 per cent of all the cheese produced in this country; (2) cottage, including pot and baker's, 16 per cent; (3) brick and Munster, 5.6 per cent; (4) cream and Neufchatel, 5.4 per cent; (5) Swiss, including block, 4.3 per cent; (6) Italian varieties, 1.4 per cent; (7) Limberger, 1.3 per cent; and (8) all other varieties, 1.1 per cent. As to value the order is slightly changed and is as follows: (1) Cheddar, (2) cream and Neufchatel, (3) cottage, including pot and baker's, (4) Swiss, including block, (5) brick and Munster, (6) Italian varieties, (7) other varieties, and (8) Limberger.

### A Product of Importance

It has been found that cottage cheese, including pot and baker's, ranks second in volume produced and third in value. According to these figures it would seem that cottage cheese is no longer merely a by-product of the dairy industry but is a product of considerable importance. Many creameries and milk plants in regions where skim milk is available and where a market for cottage cheese can be developed would no doubt find it profitable to give more attention to its manufacture.

To increase the consumption of cottage cheese a good and uniform product must first be made available to the public. To accomplish this there must be a supply of skim milk of good quality. The manufacturer must adopt a method that will produce the particular type of cottage cheese most in demand, then handle the manufacturing process as carefully and as uniformly as he does the manufacture of higher-priced dairy products.

The Bureau of Dairy Industry has recently perfected a method which consistently produces excellent results. By using this or a similar method more dairy-products plants could improve the quality of their cottage cheese and thus utilize their skim milk more profitably.

H. L. WILSON, *Bureau of Dairy Industry.*

## COTTON Communities Showing More Interest in One-Variety Plan

The advantages of limiting production to a single variety in each community or district are becoming more and more widely recognized among cotton growers and others interested in cotton production. The 1-variety plan has already been adopted and applied in most of the cotton-producing districts of the southwestern irrigated valleys, and the experience in these communities may facilitate the extension and stabilization of the system of organized production in the eastern Cotton Belt.

The primary object of 1-variety organization is to establish and maintain a regular supply of pure seed, to be used as the basis of production by the entire community. (Fig. 25.) The first step to be taken, where an active local interest in the 1-variety plan has developed, is to form a growers' association to which all bona fide growers



FIGURE 25 —A breeding block of Acala cotton on United States Acclimatization Field Station, State College, New Mexico, where the purity and superior quality of the seed are maintained for organized community planting

within the community should be eligible. To give stability and continuity to the effort, each member should sign a 5-year agreement to plant only the variety of cotton designated by the board of directors.

### Community Boundaries

In California the 1-variety districts are designated by counties, and many of the cotton-growing areas of the Southwest are separated from each other by mountain ranges or stretches of unirrigated desert, which afford ample protection from the danger of crossing with other varieties or with other stocks of seed. Where separate geographical features do not exist, as in many parts of the eastern Cotton Belt, more care has to be taken in locating seed-producing areas that can be protected in other ways.

One-variety areas also may be located with reference to soil types, in the interest of safer and more regular production of seed.

A gin unit, or the area from which a single gin draws its custom, may afford a satisfactory basis of a community effort, particularly if the gin is isolated enough to be free from the competition of other gins.

Having all of the custom of one gin of the same variety brings obvious advantages in keeping the seed pure and in being able to regulate the gin machinery so that there is a minimum of damage to the fiber.

### Selecting a Variety

Community production of any good variety is better than a multiplicity of varieties. The better the variety selected, however, the easier it is to attain community production. Properly conducted variety tests are the best means of determining the relative value of a variety, but the community organization need not wait for local tests to be made. Recommendations of the State university or extension service can be followed safely, or the association can be formed and the members choose by vote the variety with which to start. In case another variety is later found to be better, a local seed supply can be developed and the entire community changed over. The initial variety, however, should be one of which an adequate supply of pure seed is obtainable.

### Final Stages of Community Organization

Most growers can readily appreciate the advantages of 1-variety production, but a community often contains a small proportion of growers to whom these advantages are not so easily discernible. A 100 per cent 1-variety community is therefore much more difficult of attainment than a nearly 100 per cent community, and some means of protection against reactionary growers may be needed.

The gins can be of material assistance in dealing with this problem by refusing to gin outlawed varieties. The communities can also be protected by county ordinances or State laws prohibiting the planting, harvesting, and ginning of other than one variety in districts that are attempting to organize themselves on this basis. Restrictive ginning and legal measures, however, should not be invoked to coerce mixed-variety communities into 1-variety production, but should apply only to communities already established on a 1-variety basis and practically unanimous in their choice of variety.

H. G. McKEEVER, *Bureau of Plant Industry.*

**COTTON Data Record**      Data on the grade and staple of cotton  
**Variation in Staple**      ginned in the United States for three  
**Length, 1928-1931**      consecutive years are now available, and  
    similar data on ginnings up to Decem-  
    ber 1 of the fourth year are available. We are approaching the time,  
 therefore, when it may be possible to get some perspective of the  
 trend of staple length—some definite information as to whether  
 the staple length of American cotton is deteriorating or improving.  
 Data covering a period of but three or four years are, of course,  
 inadequate as a basis for definite conclusions, information covering  
 a longer period being required to establish trends with any degree of  
 certainty. But the figures now available do permit of some inter-  
 esting comparisons.

Figure 26 shows the proportions of the several staple lengths of American upland cotton ginned in each of the three cotton years, 1928, 1929, and 1930; and Figure 27 shows corresponding proportions of these

staple lengths ginned prior to December 1 in each of the four years, 1928, 1929, 1930, and 1931.

In each of the three years for which data on the entire crop are now available, the proportion of the total crop that was  $1\frac{1}{8}$  inches and longer in staple constituted less than 5 per cent of the total ginnings. Not only do these lengths constitute a comparatively small part of the crop, but they are grown, for the most part, only in restricted areas. The proportion of the crop ranging in staple length from  $\frac{7}{8}$  to  $1\frac{1}{8}$  inches, inclusive, grown quite generally throughout the Cotton Belt, constituted approximately 81 per cent in 1928, more than 75 per cent in 1929, and more than 83 per cent in 1930.

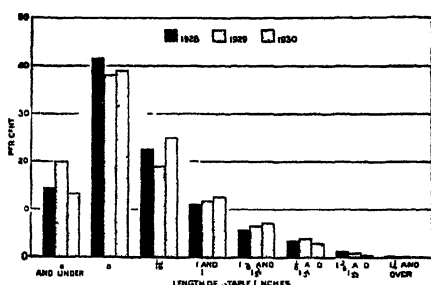


FIGURE 26.—Percentage distribution, by staple length, of cotton ginned in the United States, crops of 1928, 1929, and 1930

### Available Figures Inconclusive

Persons asserting that the staple length of American cotton is deteriorating point to the large quantity of cotton shorter than  $\frac{7}{8}$  inch that was ginned from the crop of 1929, as compared with that ginned from the crop of 1928. It should be borne in mind that, although the proportion of these short lengths increased from more than 14 per cent of the crop in 1928 to 20 per cent in 1929, it decreased to approximately 13 per cent of the crop in 1930. In so far as ginnings to December 1 may be taken as indicative, a further decrease may be expected for 1931. This expectation is based on the fact that cotton

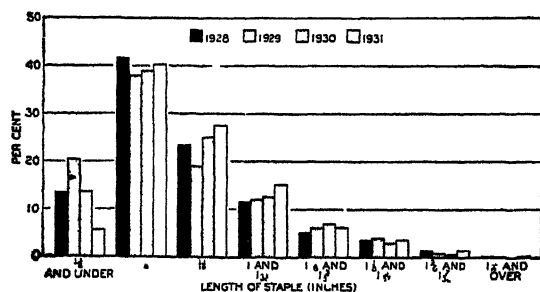


FIGURE 27.—Percentage distribution, by staple length, of cotton ginned in the United States prior to December 1 of the years 1928, 1929, 1930, and 1931

shorter than  $\frac{7}{8}$  inch constituted only about 5½ per cent of ginnings prior to December 1, 1931, as compared with 13½ per cent, 20½ per cent, and 13½ per cent, respectively, for the corresponding periods in 1928, 1929, and 1930. A similar comparison shows that an appreciably larger proportion of cotton ranging in length from  $\frac{7}{8}$  to  $1\frac{1}{8}$

inches was ginned prior to December 1, 1931, than during the corresponding period in either of the three preceding years. In this connection, attention is called to the favorable weather conditions prevailing throughout a great part of the 1931 season.

A comparison of Figures 26 and 27 will show that the proportions of the various staples in the ginnings to December 1 have not materially differed from those of the entire crop during the last three years.

Although no official data are available that would indicate the extent of deterioration in staple length of American cotton prior to the inauguration of the grade and staple estimates work of this department, the preliminary figures now available do not indicate that deterioration in staple length has occurred during the last three years.

W. B. LANHAM, *Bureau of Agricultural Economics.*

**C**OTTON Exports to Russia Before the World War, Russia  
Decline as Acreage and ranked sixth among foreign coun-  
Output There Increase tries in mill consumption of Ameri-  
can cotton. It held a similar place

in 1927-28 when the postwar peak of American cotton consumption by Russian mills was reached. In the last few years Russia's home production of cotton has increased considerably, reaching the prerevolutionary peak, and its imports of American cotton declined until they have practically ceased during the 1931-32 season. Russia occupies an important position in the world of cotton. Among cotton-growing and cotton-manufacturing countries it ranks sixth in number of spindles; fifth in production of lint; and fourth in acreage devoted to cotton. The increase in Russian cotton production has attracted widespread attention and given rise to the question: How much competition is the American producer likely to meet from Russian cotton?

The possession of a domestic source of raw-cotton supply makes the Union of Socialist Soviet Republics, as Russia is now officially styled, unique among the European cotton-manufacturing countries. It also has a large domestic market for cotton goods. Although the production of Russian cotton increased rapidly during the pre-war and early war years and again resumed an upward course after the interlude of the revolution and civil war (1917-1921), it has usually not been sufficient to satisfy the requirements of the Russian manufacturing industry. The Russian cotton industry depended, at least until recently, on foreign sources (principally the United States) for a large proportion of its raw material; hence the importance of Russia as a market for American cotton.

American cotton on the Russian market has had to meet the increasing competition of the Russian-grown cotton from Turkestan or central Asia and Transcaucasia. Cotton has been grown on irrigated land in Turkestan and Transcaucasia for many centuries. The former section is especially important and accounts for the bulk of the Russian cotton supply. Cotton in Turkestan is grown by small peasant cultivators who formerly used, for the most part, primitive implements and a prodigious amount of labor in raising the crop on their small plots.

Even before the World War, there was a movement to make Russia self-sufficient, as far as possible, in the matter of raw cotton supply. Both the Government and the manufacturers were interested in this project. Domestic production was encouraged by a high protective tariff on imported cotton, taxation privileges for the growers, extension of railway facilities in the cotton-growing districts, and new irrigation construction on which extension of the Russian cotton acreage principally depended. Such measures, coupled with the fact that cotton is, on the whole, well adapted to the climatic conditions and the small-scale, highly intensive agriculture of Turkestan, resulted in a large expansion of the acreage and production of Russian cotton.

### Expansion in Turkestan

The area devoted to cotton in Turkestan more than trebled between 1890 and 1910, as far as the inadequate statistical data enable one to judge. Considerable expansion in acreage also occurred in Transcaucasia. At the same time, the displacement of native cotton varieties by American upland types proceeded rapidly so that little native cotton was being planted at the outbreak of the war. The expectation of increased prices, with the entrance of Russia into the World War, provided a further incentive to the extension of cotton cultivation and by 1915 Russian cotton production reached a record figure of 1,500,000 to 1,700,000 bales of 478 pounds each.

Consumption of domestic cotton also exhibited an upward trend. In 1890, domestic cotton constituted one-fourth of the total Russian mill consumption (including Russian Poland but excluding Finland); by 1910, it was more than a half; and in 1914, when the peak of Russian mill consumption was reached, it constituted 60 per cent. Consumption of American cotton likewise showed an actual increase, though its relative importance in the total Russian mill consumption declined. In 1890 Russian mill consumption of American cotton amounted to 375,000 bales of 478 pounds, or 62 per cent of the total, and in 1910, 596,000 bales, or 36 per cent of the total.

The World War and the Russian revolution with its consequent economic isolation of Russia and disorganization of economic life, led first to a decline and later to a cessation of imports of cotton into Russia. Imports were not resumed on any considerable scale until 1923. Consumption of American cotton by Russian mills, which was estimated at only 27,000 running bales in 1921-22, increased to 493,000 bales during the season of 1927-28, exceeding even the pre-war record. A rapid decline, however, has followed and apparently little American cotton was consumed during the season 1930-31.

### Significance of the Drop in Imports

The downward trend of Russia's cotton imports during the last three years seems to suggest that the country is nearing its goal of cotton independence. But it should be borne in mind that, with a monopoly of foreign trade and of the textile industry, together with the power to ration consumption, the Government can restrict imports in order to maintain a favorable balance of trade, even should the domestic production fall short of replacing imported supplies. The Government appears to be making every effort to push the cotton industry. Contracts with growers for acreage, on the basis of which advances are paid to them, have been made each season. To provide an adequate supply of cheap grain for central Asia so that the farmers could devote a larger acreage to cotton, a railroad connecting Turkestan with the grain regions of Siberia was constructed. Reduced taxation of land under cotton and exemption for a 5-year period of cotton acreage in new growing regions were granted.

Selected seed, modern implements, and tractors are being introduced. In 1923-24 there were only 39 tractors in central Asia; by 1926-27, the number had increased to 1,270; and by 1929-30 to 3,609. Use of mechanical power relieves the shortage of draft animals, which is acute among the cotton growers of Turkestan (many of whose holdings, however, are too small to permit a profitable employment of their

own stock), and as it diminishes the required feed-grain acreage it increases the acreage that may be devoted to cotton. To utilize the available supply of tractors efficiently, a number of them are operated together with other improved machinery under single direction for a number of farms. These units are called "machinery tractor stations." Collective and State farms which accounted for a little over 70 per cent of the 1931 acreage are replacing the small individual grower. However, there are chronic complaints of various defects in the organization of the Russian cotton-growing industry, such as shortage of labor, inadequate supplies, or poor distribution of grain and manufactured articles in the cotton-growing districts, etc. The average yields are below pre-war and have shown a downward trend during the last few years. Nevertheless, in 1930 a crop of more than 1,500,000 bales of 478 pounds (or 68 per cent above the 1909-1913 average production) was harvested, thus reaching the previous Russian peak production of 1915.

#### Russian Mill Consumption

In 1909-1913, domestic cotton constituted little over half of the total Russian mill consumption. To cover the requirements of the Russian cotton industry, if the output remains at the pre-war level, it would apparently be necessary for the Russian production of cotton to be approximately double that of 1909-1913. However, the present capacity of the spinning industry of the Union of Soviet Socialist Republics is nearly one-fifth less than that of pre-war Russia because of the secession of territory. This, in turn, tends to reduce the raw material requirements, except as the reduction in spindlage may be offset by other factors such as an increase in the number of hours worked, etc. On the other hand, cotton production in 1930 was almost 70 per cent above the average for 1909-1913 and a further increase was expected in 1931 with the larger acreage. It would seem, therefore, that the Soviet Government can not be very far from the attainment of its objective of self-sufficiency on a pre-war basis in the matter of cotton supply.

Although exports of American cotton into the Union of Soviet Socialist Republics are primarily affected by this situation, it is noteworthy that the Government is also planning to develop the growing of Egyptian (long-staple) cotton.

An output of cotton goods not exceeding pre-war quantities would entail a standard of consumption below pre-war standards, as the population of the Union of Soviet Socialist Republics increased between 1913 and 1931 by approximately 15 per cent. Furthermore, a considerable portion of the Russian pre-war supply of cotton yarn and cloth was provided by the highly developed manufacturing industries of the Polish and Baltic regions, which seceded after the revolution and which were formerly not separated by customs barriers from the rest of Russia. Therefore, should an expansion of the Russian textile industry and a rising standard of living of the Russian population occur in the near future, a further considerable increase of Russian cotton production, or alternatively, greater imports of foreign cotton, would be necessary, especially since the growing industrialization of the Union of Soviet Socialist Republics probably would result in the increased industrial use of cotton. On the other hand, there must be borne in mind the possible production of substitute textile fibers. Such substitutes, if found, would, of course, tend to diminish the use of cotton in the future.

## Additional Land Available

As far as land resources are concerned, there are undoubtedly opportunities for a further expansion of the Russian cotton acreage as well as for increasing the yield per acre by improved cultural methods. The increase during recent years has taken place largely through the displacement of other crops, principally cereals on the irrigated lands of Turkestan and Transcaucasia. There may be a possibility of a further shift to cotton on irrigated land. Such land was roughly estimated at 11,000,000 to 12,000,000 acres as against a cotton area of some 4,000,000 acres. Not all of the irrigated land can be devoted to cotton; not all is actually sown to crops each year. In the opinion of some Russian authorities cotton should not occupy more than one-third to one-half of the sown area, but others consider a higher proportion of cotton feasible. The irrigated area undoubtedly can be greatly augmented through new construction, but this will involve considerable capital outlay.

A less costly method of cotton expansion is the extension of cotton cultivation into nonirrigated areas. Nonirrigated, dry-farming land of Turkestan is beginning to be utilized on a small scale for cotton; but of far greater importance is the strong effort made during the last two years to develop cotton growing in European Russia, particularly in north Caucasus, Ukraine, and Crimea where cotton was not cultivated previously except on an experimental scale. In 1931, the new cotton areas already accounted for 17 per cent of the total Russian cotton acreage. It is too early to say whether this experiment is really a success. Difficulties are likely to be encountered, especially in view of the extension of cotton cultivation far northward. In any event, the yields are bound to be lower than on the irrigated lands of Turkestan and Transcaucasia.

During the last few years the Union of Soviet Socialist Republics exported small quantities of cotton although the country was on an import basis. These exports were probably dictated by financial exigencies of the balance of international payments. Under a monopoly of foreign trade and the textile industry, sales of the better cotton for the purpose of obtaining foreign currency are likely to occur and may even increase in the future, notwithstanding a short supply of cotton. With Russian exports and Russian imports of cotton the foreign exchange situation is an important factor. In the long run, however, whether the Union of Soviet Socialist Republics will be self-sufficient with respect to cotton, or on an import basis, or (much more problematical) will develop a considerable export surplus of cotton, is likely to be determined largely by the outcome of a race between the standard of living of the Russian population and the capacity for increased cotton production.

L. VOLIN, *Bureau of Agricultural Economics.*

**C**OTTON Fiber Improvement Necessitates Community Action to Keep Seed Pure

The sexuality of plants and the conveyance of pollen by insects have been studied intensively for the past century, and many curious relations have been revealed. Since the time of Darwin hundreds of floral specializations to attract insects have been described in the

different families of plants, and insects have been found to be carriers not only of pollen grains but of fungus spores, bacteria, and other microscopic organisms that cause epidemic diseases, such as malaria, yellow fever, typhoid fever, and bubonic plague. Sanitation of seed stocks is necessary in the cotton industry, in order to produce better fiber.

The floral biology of the cotton plant is relatively simple. The flowers are conspicuous, with nectar glands at the base. The large tuberculate pollen grains have their surfaces covered with mucilage and are not carried by the wind, but adhere readily to bees and other insects. (Fig. 28) Each flower is likely to be visited many times, and bees may come from a mile away. If the trails of the insect visitors could be visualized, the cotton fields of any community would appear to be completely covered and connected by a network of cross

pollination. Different breeds of cattle can be fenced in separate pastures, but there is no way to keep cotton from being crossed.

Where different varieties are raised in the same community an extensive mixing of seed occurs at the public gins. When this mixed seed is used the work of the bees in crossing the different plants in the fields is a mongrelizing process, leading to an indiscriminate diversity of plant characters and a corresponding irregularity of fiber. (Fig. 29.) Hybrids between different varieties may appear promising in the first generation, but "break up" and degenerate in second and later generations.

Mixing and crossing undoubtedly have increased with the development of the public-gin system since the Civil War. A general deterioration of the fiber has occurred, and now has reached the point at



FIGURE 28.—When several varieties of cotton are planted in neighboring fields, bees and other insects that visit the flowers cross fertilize and mongrelize the different sorts. This results in deterioration of the seed stocks and the production of irregular fiber of poor quality. (About natural size.)

which cotton from other countries to some extent is replacing American cotton in Europe.

### More Uniformity of Fiber is Greatest Need

Since the cotton fiber has to be spun by accurately adjusted textile machinery, making the fiber more uniform is the greatest improvement that can be accomplished by selective breeding. Varieties with fiber of any desired length, from  $\frac{1}{2}$  to 2 inches, can be produced. Fiber less than 1 inch long is "short staple," which should in general be replaced by uniform varieties with staples 1 inch or more in length. The longer the fiber the greater the need of care in maintaining the uniformity of the seed stocks, if production is to be on a practical scale. For-

merly it was supposed that the discovery or development of better varieties of cotton would bring an improvement of the fiber, but experience shows that the practical possibilities of improvement depend on establishing good varieties in regular, continued cultivation.

On account of the effects of mixing and crossing, the production of uniform cotton depends on isolating the seed stocks of the varieties. Instead of growing different varieties in the same localities, each community or district that undertakes to produce uniform cotton must restrict itself to a single superior variety, in order that the variety may be preserved by keeping the seed pure. Continued selection and roguing also are required in order to maintain a uniform type, but these precautions are of little effect if the seed stocks are not isolated.

The first step in practical improvement of cotton fiber is to provide the 1-variety conditions for maintaining the necessary supplies of pure seed. The crop must be varietized by communities before the fiber quality can be standardized effectively, that is, before the fiber can be made as uniform as possible, and kept uniform from year to year, during a period of commercial production.

The methods of preserving and utilizing superior varieties are a part of the problem of fiber improvement, no less than the methods of breeding and selection.

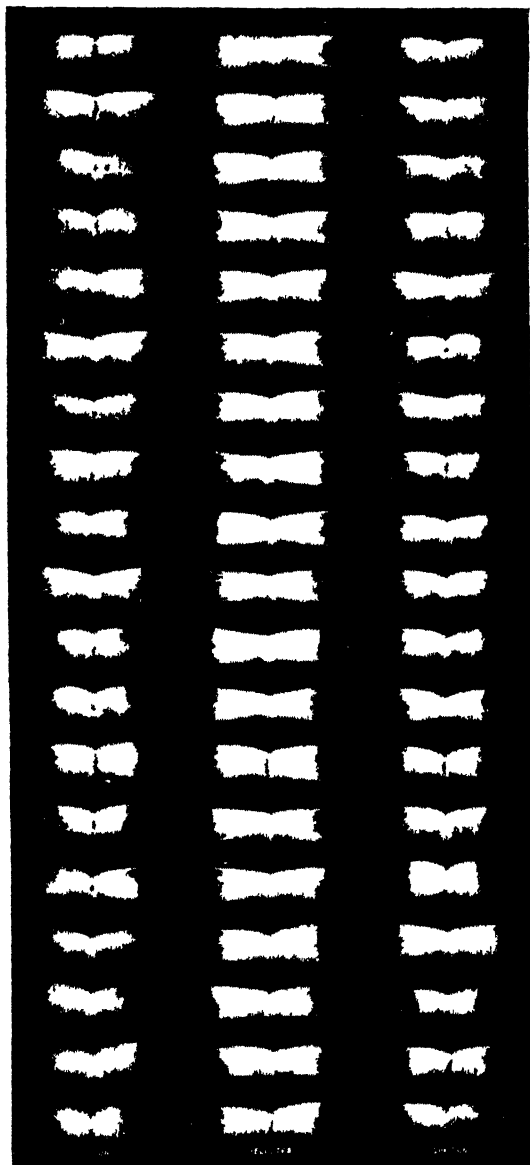


FIGURE 20.—Center row shows uniform cotton produced from pure selected seed. First and third rows show irregular fiber grown from seed of different varieties that have been mixed at the gin and mongrelized in the fields by insects (One fourth natural size)

### Better Buying System Needed

Nobody knows how much cotton of more than 1-inch staple would be used, or how much advantage uniform fiber would have in the market, if adequate supplies were regularly available, as has never been the case. The annual production of sea-island cotton in South Carolina, Georgia, and Florida once ranged for many years from 70,000 to 100,000 bales, and several times as many bales of upland long-staple cotton were grown in Mississippi, Louisiana, and eastern Texas. With the arrival of the boll weevil, not only were these crops of long-staple cotton destroyed and the long-staple varieties discarded, but several of the former long-staple markets were abandoned. The tendency that has ruled in recent years, not to discriminate in the quality and price of cotton in primary markets, has stood in the way of improvement of the fiber. Even the slight premiums necessary to encourage planting early and productive varieties with uniform moderate-length staples have often been refused to the farmers, thus discouraging the planting of good varieties and the taking of precautions necessary to keep the seed pure. Hence it is being recognized that the system of buying must be improved, as well as the system of production, in order to improve the fiber.

O. F. Cook, *Bureau of Plant Industry.*

### COTTON Growers Advised Not to Try Large-Scale Planting of Sea-Island

Sea-island cotton, when grown from pure selected seed, is the most valuable of the world's cottons. It is a cotton de luxe with a silky staple from 1½ to 2½ inches long, surpassing all other types in length, strength, and fineness of fiber. For the manufacture of sewing thread, laces, fine dress goods, and for woven fabrics combining extreme lightness with maximum strength and durability, such as airplane wings, balloon and parachute cloth, gas cells for dirigibles, etc., sea-island cotton is literally in a class by itself among the world's cotton fibers.

Commercial planting of sea-island cotton is now confined almost entirely to Porto Rico and other islands of the West Indies. The present total annual production is less than 10,000 bales, and practically all of this crop represents fancy grades with staples 1¾ inches long and upward. The longest sea-island cotton is now grown in St. Vincent, British West Indies, where staple up to 2¾ inches and longer is produced from seed of one of the fancy "crop lot" strains imported from South Carolina.

### Former Production About 90,000 Bales Annually

Before the invasion of the boll weevil into the Southeastern States, where the sea-island cotton was formerly grown, the average annual production of this cotton was about 90,000 bales. About one-tenth of this production represented fancy grades with fiber from 1¾ to 2¾ inches long, the bulk of the crop ranging from 1½ to 1¾ inches in length. After the invasion of the weevil, production of sea-island cotton in the Southeastern States rapidly declined and about 10 years ago was practically abandoned.

Anticipating the serious danger of losing the seed stocks, which had been developed through more than 100 years of careful breeding and selection, experiments were immediately undertaken by the United States Department of Agriculture in cooperation with the Agricultural

Society of South Carolina and interested growers on the Sea Islands, to investigate the practical possibilities of producing sea-island cotton under boll-weevil conditions and at the same time to preserve a stock of planting seed, should interest be revived in this cotton in later years.

The experiments included studies of the possibilities in cultural control of the weevils by the improved method of "thick" spacing of the plants in the rows to produce earlier and larger crops; fertilizer tests; and other forms of production improvements, as well as the breeding of earlier strains, and use of the methods of direct protection of the crop by poisons (Fig. 30.)

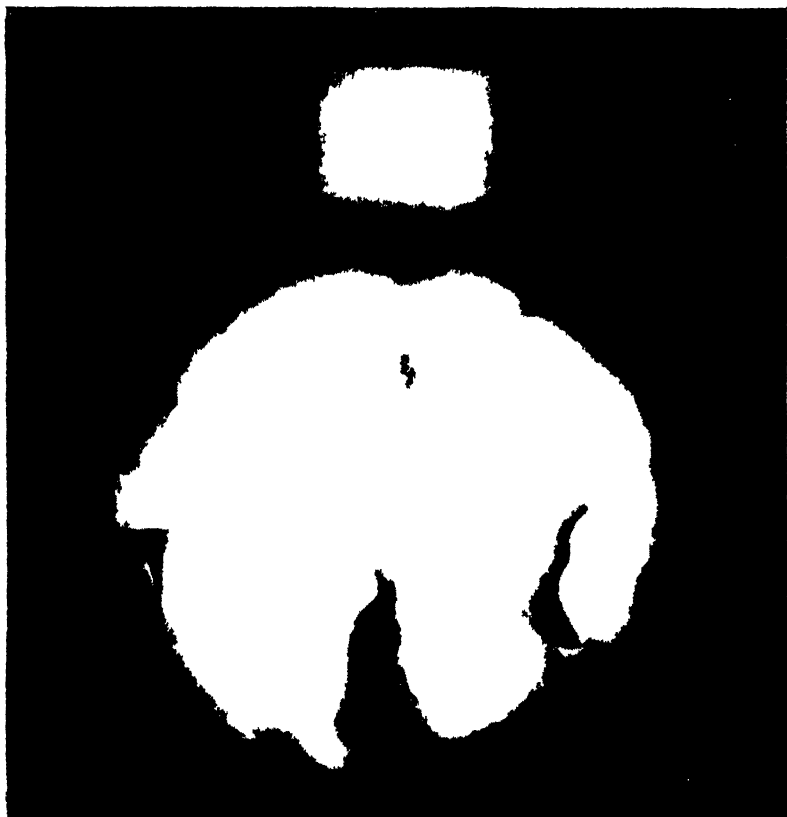


FIGURE 30—Upland cotton boll. (Natural size) Compare with sea-island boll

### Exclusion of Other Types Necessary

By experimental plantings over a period of more than 10 years, it has been fully demonstrated that sea-island cotton can not be successfully grown under the old system of mixed-variety planting with upland cotton, as formerly practiced by the growers in the mainland districts of Georgia and Florida. Unlike the upland varieties, sea-island cotton is susceptible to serious damage from boll weevils during the entire period of development of the crop, and weevils bred in the flower buds of the earlier upland short-staple cotton usually prevent the setting of a crop on the later maturing sea-island plants.

Experience has shown that the only possibility of successful production under present conditions is in communities or districts devoted entirely to the planting of sea-island cotton, to the complete exclusion of any other variety or type.

In the absence of supplies of sea-island fiber, the American market for this cotton completely disappeared several years ago, and the

problems of restoring a satisfactory outlet for the fiber, if and when it is produced, are equally important with the problems of production. (Fig. 31.) A regular supply of the sea-island fiber must be assured in order to reestablish an American market, and, by the same token, a fair price for the fiber must be assured to the growers in order to encourage organized effort to establish isolated sea-island communities where the seed can be kept pure and the quality of the fiber maintained.

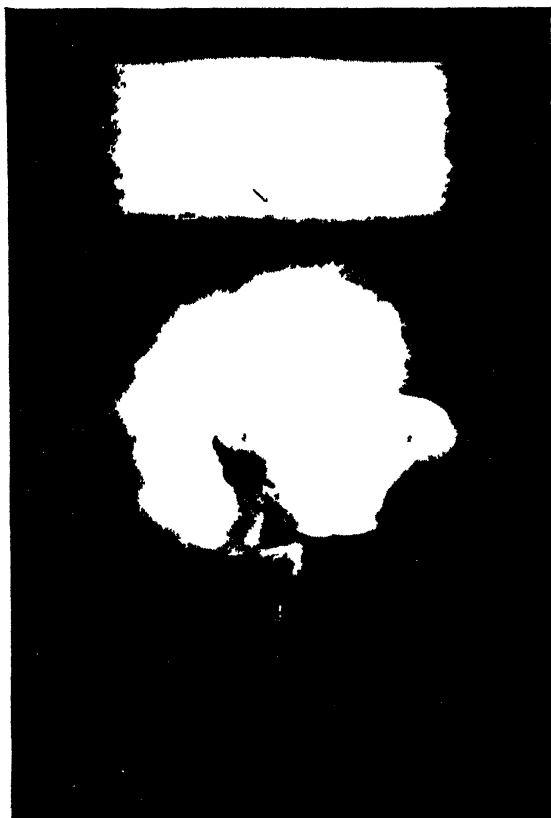


FIGURE 31—Sea-island cotton boll (Natural size) It costs several times as much to pick the small bolls and roller gin the sea-island cotton as it does for upland cotton

#### Planting of Sea-Island Not Advised

Intensive studies of these and other fundamental problems of production are being made by the department in cooperation with growers and manufacturers. At

present, satisfactory market arrangements have not been worked out with manufacturers, and until more information is available, farmers are being advised not to plant sea-island cotton on a large scale anywhere in the continental United States.

C. B. DOYLE, *Bureau of Plant Industry.*

#### COTTON Progressively Lowered in Grade by Exposure, Tests Show

Weather and exposure lower the grade of cotton. Every cotton farmer knows this and tries to pick his cotton under the best conditions as soon as possible after the bolls are ready. How much change takes place with exposure, and what kind of change, has never been known.

The universal standards for grade of American upland cotton recognize five color classifications which are put up in physical form, Extra White, Blue Stained, White, Yellow Tinged, and Yellow Stained, and three descriptive classes, Gray, Spotted, and Light Stained. Within each class there is a wide range of color variation, as in the white grades in which the color varies from the very light creamy cottons of Good Middling and above to the dark spotted cottons included in Good Ordinary.

In order to make a preliminary survey that would reveal something about these different colors, what caused them, how stable they are, and other characteristics, a study was undertaken in the 1930 season on cotton grown at the South Carolina Experiment Station at Clemson College. The study was limited to the factor of exposure.

The method of procedure was: In September, when the cotton was opening profusely, a great many newly opened bolls were tagged for future consideration. A certain number of these tagged bolls were picked on the date of tagging and at regular intervals for several days,

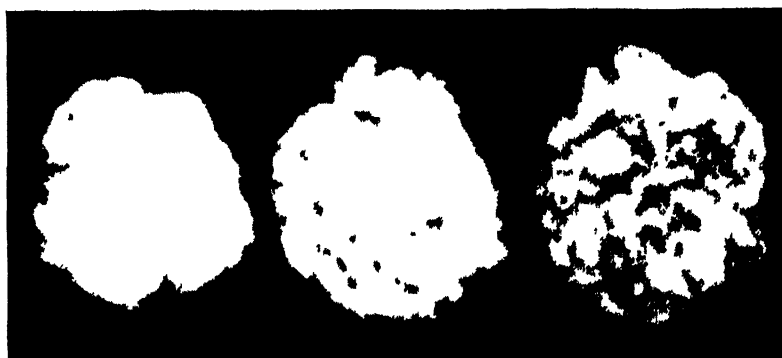


FIGURE 32—Exposure alone causes these differences. The cottons were ready to pick by mid-September. The samples illustrated were picked during the latter part of September, the middle of December, and the first of March.

then daily for approximately two weeks, and weekly thereafter as long as there were tagged bolls remaining on the stalks. This provided a series of the same cotton, grown in the same field, under identical conditions. (Fig. 32.)

#### Definite Color Trend Shown

The samples were small, hand picked, and hand ginned, yet they provided excellent material for a study of the actual fiber color change. Although they are not entirely representative of grade since they contain so little trash, yet the grade given to them by Government classers lowers regularly from the first to the last of the season and follows the same trend that would take place in the classification of commercial samples. During the first two weeks after tagging, all of the samples graded Strict Good or Good Middling White or Spotted. The last sample to grade in the White grades was picked on the eighteenth day after tagging. From that time on the samples graded progressively through Good Middling Spotted, Good Middling Gray, Strict Middling Spotted and Strict Middling Gray, Good Middling Blue, Middling Spotted, Strict Middling Blue, Strict Low and Low Middling Spotted, and finally became so low in color that they could not be

graded against the standards. Measurements of the color of these cottons show a very definite trend from light, somewhat creamy cottons of the high White grades down through the Grays to the low-grade Blue cottons. The spots which caused some of the higher grades to fall into Spotted classifications seemed to be of different origin from those of the low grades, the general background color of the low grades being gray or blue even though they were called Spotted cottons. The measurements showed that the cottons picked after the middle of January were so low that there are no equivalent grades for them.

This study covers only one eastern cotton under weather conditions of 1930-31. Cottons from several sections of the Cotton Belt were studied in 1931, with many additional laboratory tests made upon them in order to discover correlated factors; that is, as the grade deteriorates by exposure, what other changes in characteristics occur that affect the spinning utility of the cotton.

It is a significant fact that exposure in the field for only two or three weeks after the bolls first open will lower the grade of the cotton.

DOROTHY NICKERSON, *Bureau of Agricultural Economics.*

## COTTON Root Rot Causes Great Loss in Southwest; Control Problem Unsolved

ton root-rot fungus (*Phymatotrichum omnivorum* (Shear) Duggar) which

During recent years, studies in Texas and Arizona have resulted in an increased knowledge of the habits and life history of the cotton

causes the serious root-rot disease in these and other Southwestern States. (Fig. 33.) The disease is most prevalent in Texas, where it causes losses estimated at \$100,000-000 annually. It is also responsible for serious losses in parts of Oklahoma, Arkansas, New Mexico, Arizona, southern California, and northern Mexico.

The disease attacks not only cotton but alfalfa and many important field crops, vegetables, fruit and shade trees, berries, and ornamental plants. (Fig. 34.) Texas investigators have listed 274 species of cultivated plants and about



FIGURE 33—Characteristic appearance of a cotton plant dying from effects of the root-rot fungus

350 noncultivated species which serve as hosts of the fungus. The root-rot fungus is undoubtedly native to most of the areas where it occurs, as it is found on wild plants remote from cultivation, and



FIGURE 34—A pistache tree killed by the cotton root-rot fungus near Indio, Calif.

often appears in the first crops planted on virgin soils. There is no evidence that the disease is disseminated by such agencies as farm implements, animals, wind, or irrigation water, but it may be transmitted by the transfer of infected plants or sclerotia. It usually persists in the same areas for many years.

The growth of the fungus is entirely subterranean except when it is producing fruiting bodies, and all of the direct injury is to the roots of plants. The fungus spreads by sending out numerous fine filaments, which advance among the soil particles. Some of these develop into strands which convey food materials for the extension of growth. (Fig. 35.)

#### Irregular Cycles of Activity

Maps prepared over a period of several successive years from careful measurement of root-rot spots in cotton fields show irregular



FIGURE 35—A rhizomorphic type of strand of the cotton root-rot fungus obtained from the soil beneath a spore mat ( $\times 6$ )

ycles of expansion and recession in the activity of the fungus. Some pots that have shown regular bands of new growth each year for several seasons may break up and leave only a few centers of infection within the invaded area. From these new growth takes place, and as expansion continues in later years, the spots may resume the same

contours as they formerly had.

The root-rot fungus is known to have three stages of development in its life history. These are the Ozonium or vegetative stage, the Phymatotrichum or conidial stage, and the sclerotial or resting stage. The conidial stage appears as cushions or mats of spores on the surface of the ground, under special conditions of shade and moisture. The mats are white in color when first developed, but turn buff as they grow older, and in the later stages break down into a brownish powdery mass of conidia. The spores do not germinate readily, and there is no evidence that they can cause infection. The sclerotial stage develops in the soil in the form of swellings or nodular enlargements of the strands. (Fig. 36.)

The sclerotia vary in



FIGURE 36—Sclerotia of the cotton root-rot fungus developing in jars containing sand and cotton roots ( $\times 1\frac{1}{2}$ )

size and shape, some being small rounded bodies like mustard seed and others attaining the size of small peas. Chains or clusters of sclerotia are also sometimes formed, and may be three-fourths of an inch or more in diameter.

The sclerotia are either scattered or grouped in the soil, and have been found at depths of from 3 to 92 inches. A cubic foot of soil may contain as many as 4,000 to 5,000. Under favorable conditions they germinate readily and are capable of infecting plants. Sclerotia were found to be viable after being kept in soil under laboratory conditions for two and one-half years, and it is indicated that they may live at least that long under

some conditions in the field. They are readily killed by disinfectants and by exposure to drying, but live for a long period in moist soil or submerged in water.

### No Entirely Satisfactory Control Measure

None of the control methods that have been tried are entirely satisfactory. Clean fallowing, repeated applications of barnyard manure over a period of several years, and subsoiling combined with rotation with nonsusceptible crops were effective in reducing the extent of the disease in some experiments. In some sandy soils it has been demonstrated that disinfectants such as formaldehyde, when applied by check flooding or by injection methods, were effective in destroying the fungus in both its vegetative and sclerotial stages. Barriers in the form of open trenches, sheet metal, or mixtures of soil with fuel oil or sulphur were found to limit the spread of the fungus. Applications of commercial fertilizers hastened the maturity of the cotton crop and increased the yield in some infested areas, but did not greatly influence the extent of infestation. Repeated attempts have been made to breed a strain or variety of cotton that would be resistant to root rot, but the results have been rather discouraging. More promising results were obtained in testing for resistance some of the fruit trees and ornamental plants.

C. J. KING, *Bureau of Plant Industry.*

**C**REAM to Whip Readily  
Must Be of the Proper  
Temperature and Age

Whipped cream is generally considered an appetizing delicacy only, but it is a valuable food as well. No other dairy product is used so extensively as a basis for desserts or to garnish them. Likewise, in all probability, no other dairy product gives more trouble to both dealer and customer. The housewife often is disappointed when, after she plans the meal, the cream fails to whip. This means complaints to the dealer supplying the cream, who in turn must go to the trouble of finding out why the cream failed to whip and must attempt to satisfy the customer.

When cream fails to whip, the first thought is that it does not contain a sufficiently high percentage of butterfat. This is rarely the case nowadays, for practically all the dairies are supplying their trade with whipping cream containing 30 per cent or more of butterfat. Cream with this percentage of butterfat will give a satisfactory whip if properly handled.

It is true that raw cream gives a slightly better whip than does pasteurized cream of the same fat content. The difference, however, is not great. It is well to consider the source of the cream, and if there is any doubt as to its sanitary quality, pasteurized cream should be selected because of the added factor of safety to human health.

Most of the trouble with whipping cream could be avoided if the importance of temperature were more generally realized. There is no other single factor which causes as much trouble with whipping as the temperature at the time of whipping. For success in whipping, the cream should be whipped at a temperature below 50° F. Many times, even when the cream has been stored at a low temperature, it is brought

into a warm room, poured into a warm container, and then whipped with a warm beater. Under such conditions the temperature of the cream may rise several degrees, and its whipping ability often becomes so greatly impaired that it fails to whip. If the housewife will remember the importance of temperature during the process and have the cream cold and all utensils chilled, she will avoid many disappointments, and there will be fewer complaints received by dairies supplying whipping cream.

### The Age Factor

When cream is separated for home use, it is well to bear in mind that age is an important factor in whipping cream. Cream which fails to whip when fresh often develops into an excellent whipping cream when aged at a temperature sufficiently low (45° F.) to prevent the rapid formation of acidity. Care must be used, however, in aging cream. If the temperature exceeds 50°, the cream may become sour before the desired effect of aging takes place. It may also develop off flavors unless it is aged under ideal conditions free from odors.

The time required for aging varies with the butterfat content. However, if the cream contains 30 per cent or more butterfat, the greatest effect will take place during the first 12 hours of aging, and at approximately 36 hours the maximum ability to whip is approached.

Therefore, in selecting a whipping cream it is important to select one that is at least 12 hours of age and contains 30 per cent or more of butterfat. Then if the cream is properly handled and kept at a temperature of 45° F. or lower before and during the whipping process, most whipping-cream troubles and disappointments will be over.

C. J. BABCOCK, *Bureau of Dairy Industry.*

**D**AIRY Bulls from Purebred Holstein-Friesian and Jersey Proved Sires Increase Output of Daughters bulls that have shown the ability to transmit to their daughters the capacity for uniformly high milk and butterfat production have been constantly in service at the experimental farm of the Bureau of Dairy Industry at Beltsville, Md. Sons of these proved sires have been placed with dairy farmers and institutions in Maryland and Virginia for use as herd sires on condition that the farmers raise all daughters of these bulls and furnish satisfactory production records on their herds. Sufficient data on the productive ability of the daughters of some of these bulls are now available to determine their transmitting ability.

Of the bulls used in this cooperative work, 14 are sons of 4 unrelated, proved Holstein-Friesian sires, and 12 are sons of 5 proved Jersey sires. These 26 sons were mated both to purebred and grade cows and have sired 257 daughters. The Holsteins have 181 daughters and the Jerseys 76 daughters with completed records. Most of the daughters and dams were tested through dairy herd-improvement associations and were handled under average farm conditions. Both daughters' and dams' records in Tables 2 and 3 have been calculated to maturity by applying the factors prepared in the Bureau of Dairy Industry. All of the daughters' records were made during the first lactation period, while those of the dams were made during various lactation periods.

The average production records of the daughters and of the dams of the daughters are shown in Tables 2 and 3. Only those sires having three or more daughters are considered in this tabulation.

TABLE 2.—Average production records of daughters of 14 Holstein-Friesian bulls each having three or more daughters, compared with the records of the dams of the daughters

Sire No.	Daughters and dams	Daughters			Dams of daughters			Increase or decrease of daughters over dams	
		Milk		Butterfat	Milk		Butterfat	Milk	Butterfat
	Number	Pounds	Per cent	Pounds	Pounds	Per cent	Pounds		
315.....	4	11,053	3.38	373.7	7,807	3.74	292.2	3,246	81.5
318.....	13	10,822	3.76	396.1	7,447	3.90	291.0	3,075	105.1
323-R.....	74	14,022	3.26	458.7	11,806	—	—	2,216	—
324-R.....	6	11,908	3.66	435.8	8,662	3.89	337.7	3,246	98.1
329-R.....	20	9,785	3.31	323.9	7,822	3.54	276.4	1,893	44.5
331-R.....	3	11,920	3.60	431.0	11,169	3.57	398.0	761	38.0
335-R.....	32	15,710	3.33	523.5	12,684	—	—	3,126	—
343-R.....	11	9,780	3.62	354.0	7,751	3.86	296.0	2,029	55.0
344-R.....	5	9,414	3.80	378.0	7,294	4.18	305.0	2,120	53.0
355-R.....	5	11,042	3.22	356.0	8,181	3.56	327.0	1,851	28.0
363-R.....	10	8,968	3.97	356.0	7,485	3.87	267.0	1,483	89.0
364-P.....	5	9,656	3.50	308.0	9,647	3.51	339.0	1—991	1—36.0
368-P.....	8	14,456	3.46	501.0	13,345	—	—	1,111	—
366-P.....	5	10,378	3.31	344.0	10,170	3.38	344.0	208	—
181 daughters and dams average.....		12,465	—	—	10,273	—	—	2,192	—
87 daughters and dams average.....		10,122	3.55	359.6	8,194	3.69	302.1	1,928	57.5
181 daughters average.....		12,465	3.40	423.8	—	—	—	—	—

<sup>1</sup> Minus sign indicates decrease.

TABLE 3.—Average production records of daughters of 12 Jersey bulls each having three or more daughters, compared with the records of the dams of the daughters

Sire No.	Daughters and dams	Daughters			Dams of daughters			Increase or decrease of daughters over dams	
		Milk		Butterfat	Milk		Butterfat	Milk	Butterfat
	Number	Pounds	Per cent	Pounds	Pounds	Per cent	Pounds		
517-M.....	10	10,271	5.13	537.0	9,543	4.84	462.0	728.0	65.0
527-M.....	5	5,962	5.19	309.2	5,239	4.96	259.8	723.0	40.4
537-M.....	3	7,226	5.52	399.0	6,015	5.07	305.3	1,211.0	94.0
544-M.....	8	8,348	4.90	410.0	10,152	3.98	404.0	1—1,804.0	6.0
563-M.....	7	6,354	4.92	312.0	5,873	4.76	279.0	481.0	33.0
579-M.....	3	5,397	5.08	275.0	5,496	4.45	244.0	1—99.0	31.0
538-K.....	8	8,669	4.39	389.5	6,745	4.40	301.0	2,124.0	88.5
549-K.....	7	8,223	5.01	412.0	6,914	5.17	357.0	1,309.0	55.0
549-K.....	5	6,311	4.79	302.2	6,761	4.78	323.0	1—461.0	1—21.0
560-S.....	7	6,811	5.49	373.0	4,957	5.34	264.7	1,851.0	109.1
577-T. R.....	3	6,911	5.68	392.4	5,544	5.37	298.0	1,367.0	94.4
540-VL'F.....	6	8,996	5.10	459.0	7,702	4.77	367.3	1,294.0	92.0
76 daughters and dams average.....		7,716	5.04	390.7	7,030	4.74	333.3	716.5	57.4

<sup>1</sup> Minus sign indicates decrease.

## Yearly Production Averages

The average yearly production of the 181 Holstein daughters when calculated to a mature basis is 12,465 pounds of milk, as compared with 10,273 pounds of milk for their dams, an average increase of 2,192 pounds.

The average yearly production of the 87 daughters and dams having both milk and butterfat records is 10,122 pounds of milk, and 359.6 pounds of butterfat, as compared with 8,194 pounds of milk, and 302.1 pounds of butterfat for their dams, an average increase of 1,928 pounds of milk, and 57.5 pounds of butterfat.

The average yearly production of the 76 Jersey daughters when calculated to a mature basis is 7,746 pounds of milk, and 390.7 pounds of butterfat, as compared with 7,030 pounds of milk and 333.3 pounds of butterfat for their dams, an average increase of 716.5 pounds of milk and 57.4 pounds of butterfat.

When the individual milk-production records of the 181 Holstein daughters were compared with the records of their dams it was found that 150 exceeded their dams in milk. Of the 87 daughters and dams having both milk and butterfat records, 68 daughters exceeded their dams in milk, 71 in pounds of butterfat, and 33 in per cent of butterfat.

When similar comparisons were made of the 76 Jersey daughters and their dams, 48 daughters exceeded their dams in milk, 58 in pounds of butterfat and 50 in per cent of butterfat.

It will be noted in Tables 2 and 3 that 22 of the 26 sires have daughters that show an increase in average milk production over that of their dams, and that 24 of these sires have daughters that show an increase in both milk and butterfat production.

The value to dairy farmers of this increased production based on the average price of milk for 1930, paid to producers in the region where these bulls were used, would amount to \$70.14 per cow per year for the Holstein group, and \$31.17 per cow per year for the Jersey group. The total value of the increase in production for two groups is \$15,064.26 per year.

While the increase in production derived from the daughters of sons of proved sires commands the dairy farmer's attention, it also reveals the fact that the chance of obtaining unprofitable daughters is greatly lessened when sons of proved sires are used.

C. J. STAUBER, *Bureau of Dairy Industry.*

## DAIRY Cows Fed More Economically If Grain Is Properly Apportioned

The proper and economical feeding of the dairy cow consists in providing all the feed nutrients she requires, not only in the form best adapted for her use but also at the lowest cost and without waste. This requires that she be fed all or nearly all the good roughage she will eat and in addition, except for a few weeks immediately after calving, enough grain of suitable protein content to meet her requirements for milk production and for maintaining her body with no loss of weight and with only a small gain. The nutrients needed to meet these requirements will be supplied with a fair degree of accuracy if the feeder follows one of the commonly used feeding standards.

When the dairy cow is not on pasture, the usual method of feeding is to give her all the roughage she will consume in the form of hay, or

hay and silage, or hay and roots, together with 1 pound of grain for each 3 or 4 pounds of milk she produces, depending upon the richness of the milk and somewhat upon the quality of the roughage. This usual method of apportioning grain is inaccurate for two reasons: (1) Because cows will get enough nutrients from good roughage alone to provide for the maintenance of their bodies as well as for the production of a certain quantity of milk; and (2) because 1 pound of grain does not contain sufficient nutrients to produce as much as 3 pounds of milk. The use of this method, therefore, results in the feeding of too much grain to low producers and the feeding of too little grain to high producers. The low producers get fat because they are overfed. The high producers not only get thin as a result of underfeeding, but their milk production declines rapidly to a point at which the nutrients provided are sufficient for the milk produced.

#### Feeding Tests at Beltsville, Md.

In order to develop a method of accurately apportioning grain to dairy cows, investigations were undertaken at the United States Dairy Experiment Station of the Bureau of Dairy Industry at Beltsville, Md. It was found necessary: (1) To determine how much hay cows of different breeds and sizes would consume when given all they would eat along with a definite quantity of silage; (2) to calculate the pounds of milk for which this quantity of hay and silage would provide nutrients, at the same time maintaining the weight of the cow; and (3) to determine by means of actual feeding trials how much grain is required to provide nutrients for the additional milk produced, and to keep the cows gaining slightly in weight.

The data on roughage consumption were obtained for Holstein and Jersey cows fed 3 pounds of silage per day per 100 pounds live weight, and in addition, all the No. 2 or No. 3 alfalfa hay they would eat. It was found that:

- (1) Large cows ate more roughage than small cows.
- (2) Both large and small cows ate roughage in excess of their maintenance requirements.
- (3) The extra roughage eaten by large cows, above maintenance requirements, was more than the extra roughage eaten by small cows.
- (4) Jerseys and Holsteins of the same size ate about the same quantity of roughage.

Calculating the maintenance requirements on the basis of the Savage feeding standard, it was found that the small cows ate about 8 pounds of hay a day more than they required for maintenance, while the large cows ate about 10 pounds of hay more than the quantity required for maintenance. It was also estimated from the Savage feeding standard that the nutrients in 8 pounds of hay would be ample for the production of 10 pounds of Jersey milk, while 10 pounds of hay would provide nutrients for at least 16 pounds of Holstein milk.

It is assumed, therefore, that if cows are fed silage and all the No. 2 alfalfa hay they will eat, only those producing more than the quantities specified will require grain. For the production of milk above these quantities, 0.6 pound of a grain mixture in which one-half of the ingredients are of a bulky nature, as ground oats or wheat bran, will provide the nutrients required for 1 pound of average Jersey milk on the basis of the feeding standard, while 0.4 pound will suffice for 1 pound of average Holstein milk.

## Method Tried for Three Winters

This method of feeding was given a practical trial at the Beltsville experiment farm for three winters. Altogether 40 Jersey cows were fed for a total of 162 cow-months; and 31 Holsteins for a total of 83 cow-months. The quantity of grain fed was adjusted on the first of each month according to the quantity of milk being produced at that time. The hay was mostly No. 2 alfalfa, and the corn silage was of average quality. The grain mixture was composed for the most part of 100 pounds of hominy feed, 100 pounds of ground oats, 100 pounds of wheat bran, 50 pounds of cottonseed meal, 50 pounds of linseed meal, and 4 pounds of salt. This mixture analyzed on the average about 19 per cent total protein. The efficiency of this method was measured by the rate of decline in milk production and by the condition of flesh in which the cows were maintained.

In these feeding trials, the Jersey cows averaged 970 pounds in weight and gave 22.5 pounds of milk a day testing 5.25 per cent; the Holstein cows averaged 1,210 pounds in weight and gave 36.5 pounds of milk testing 3.4 per cent. From the first to the last of each month, the Jerseys declined in milk production an average of 9.3 per cent, and gained 5.2 pounds in body weight; while the Holsteins declined an average of 8.5 per cent and gained 6.9 pounds in body weight.

The average daily ration for the Jerseys was 7.3 pounds grain, 12.7 pounds hay, and 27.6 pounds silage; that for the Holsteins was 8.5 pounds grain, 17 pounds hay, and 35.4 pounds silage. Based on average feed analysis, the Jersey cows ate 1.9 per cent more nutrients than required by the Savage standard, while the Holsteins ate 4.6 per cent more. The Jerseys consumed 20.2 per cent more protein than called for by the Savage standard, while the Holsteins consumed 17.5 per cent more. Perhaps a grain mixture containing a little smaller percentage of protein would have been just as satisfactory.

This method of feeding proved satisfactory since in general there was a small gain in live weight and the decline in milk production was no larger than normal.

Table 4 shows the average daily quantities of grain actually apportioned to cows giving different quantities of milk, compared with the quantities of grain that would have been fed by the common method of apportioning grain at the rate of 1 pound for each 3 pounds of Jersey milk or each 4 pounds of Holstein milk produced.

TABLE 4.—A comparison of the quantities of grain actually fed to Jersey and Holstein cows with the quantities called for by common feeding practices

Jersey cows				Holstein cows			
Milk produced daily		Grain apportioned daily		Milk produced daily		Grain apportioned daily	
Range	Average	Quantities actually fed	Quantities called for by common method	Range	Average	Quantities actually fed	Quantities called for by common method
<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
40 1-41 2.....	40.7	17.6	13.6	60 1-71 2.....	66.9	22.5	16.7
30 1-40 0.....	31.3	13.1	11.1	50 1-60 0.....	52.3	14.7	13.1
20 1-30 0.....	24.8	4.4	4.3	40 1-50 0.....	47.1	11.6	11.3
10 1-20 0.....	15.1	3.1	5.0	30 1-40 0.....	34.1	7.6	8.6
10 0 or less.....	8.1	0	2.7	20 1-30 0.....	24.0	3.2	6.0
				20 0 or less.....	15.3	.4	3.8

When the cows were grouped by breeds according to the quantity of milk they were producing, it was found that except for a few of the highest producers, most of which had been fresh only a short time, the cows ate enough nutrients to meet their requirements, and the few high producers failed by only a small margin; the highest producers lost some weight, while the remainder of the cows in most cases made satisfactory gains in weight; the declines in milk were about such as would be normally expected.

### Waste is Prevented

This new system of apportioning grain appeared, under the conditions of the experiment, to provide the nutrients required without waste, for both high-producing and low-producing Jersey and Holstein cows in all stages of lactation. This method may be applied in a like manner to other dairy breeds. To obtain comparable results it appears that, when roughages similar in kind and quality are fed, Guernseys should receive grain at the rate of 0.55 pound daily for each pound of milk produced above 12 pounds, while Ayrshires and Brown Swiss should receive 0.45 pound of grain daily for each pound of milk produced above 14 pounds.

This method is not presented with the idea that it will apply to all conditions. In general, it does seem to apply where cows are fed from 2 to 3 pounds of fair-to-good quality of silage daily per 100 pounds live weight, along with all they will consume of No. 2 or No. 3 alfalfa or soybean hay, No. 1 or No. 2 clover and timothy, or other mixed legume and nonlegume hay, or No. 1 timothy or other grass hay of the highest quality. It is necessary, however, to adjust the percentage of protein in the grain mixture so that it will properly supplement the kind of roughages fed.

Roughages fed of lower quality than those indicated will provide less digestible nutrients above maintenance requirements for milk production, and more grain will be required. Roughages of higher quality than those indicated will make available more digestible nutrients above maintenance requirements for milk production, and less grain will be required. Feeding trials at department and State experiment stations show that cows receiving all the highest-quality legume hay they will eat (particularly alfalfa), either with or without silage, will consume sufficient roughages to provide nutrients for considerably larger quantities of milk than were obtained from the above tests. The Bureau of Dairy Industry now has feeding trials in progress to ascertain what quantities of high-quality legume hay dairy cows will consume, in order to determine how large a production of milk such roughage will provide nutrients for, in addition to the cows' maintenance requirements.

J. B. SHEPHERD, *Bureau of Dairy Industry.*

## **D**AIRY Herd-Improvement Associations Complete Twenty-Five Years' Work

A dairy herd-improvement association is an organization of dairy farmers who cooperatively employ a tester to determine the amount of milk and butterfat produced by every cow owned by the members and to compute the cost of production. The records thus obtained serve as a basis for determining the kinds and amounts of feed to be

fed for economical production and to indicate the cows that do not respond profitably to proper feeding and care. Attention is also given to the rearing of young stock and the selection of herd sires. Members of many associations also cooperate in selling their dairy products and in buying farm supplies.

The first association in the United States was organized in Newaygo County, Mich., in 1905, and began work in January, 1906. According to the census of 1900 the average production of butterfat per cow in the United States was 145 pounds per year. At the completion of one year's operation the Newaygo County Association found that the 239 cows completing a year's record averaged 215 pounds of butterfat per cow, or 70 pounds above the average for all cows.

This was very encouraging and the keeping of dairy records gradually spread to other parts of Michigan and to other States as well. By 1910 there were 64 associations in 11 States. In 1915 the work covered 25 States with 346 associations. In 1925 there were 777 associations in active operation, and on January 1, 1931, there were 1,112 associations in 45 States with more than half a million cows on test.

Not only had the number of associations increased, but the average production of the cows on test had increased.

Compared to the first year's average of 215 pounds in the Newaygo County Association the average of 452 associations in 1920 showed a gain of 32 pounds of butterfat per cow. In 1925 the average was 284 pounds. In 1930 the average for more than half a million cows on test was 302 pounds per cow, a gain of 87 pounds during the 25 years of record keeping.

### Associations Have Wide Influence

Although the number of cows on test represents only a small percentage of all dairy cows in the United States, the influence of the dairy herd-improvement association program seems to have extended beyond the membership of the associations, for the general average of all cows has been raised from 145 pounds of butterfat per cow in 1900 to 180 pounds in 1930.

When the association work began it consisted chiefly of furnishing records as a basis for the elimination of low-producing cows. As the work progressed, other factors for herd improvement were added—such as feeding according to production, making a better and more economical selection of feeds, giving more attention to breeding dates, and finally making it possible to check up on the herd sire through the production records of his daughters:

The member of a dairy herd-improvement association who takes advantage of all the factors that are now available in association work has his enterprise on a sound business basis.

It can not be said that the dairy herd-improvement associations are entirely responsible for all of the general improvement of our dairy cows, but there is no doubt that the associations have contributed to this improvement, directly and indirectly, more than any other single factor.

The general plan of keeping feed and production records of dairy cows, cooperatively, originated in Denmark some 10 years previous to its introduction into the United States. At the present time there

are dairy herd-improvement associations in nearly every dairy country in the world. Denmark has 38.5 per cent of her cows on test, Finland 17.4 per cent, New Zealand 20 per cent, Scotland 18 per cent, and Canada 2.5 per cent. The United States with 23,000,000 cows has only 2.2 per cent on test.

However, if the average production of all the cows in the United States were equal to that of the 2.2 per cent now being tested in dairy-herd associations, it would require only about 14,000,000 cows to produce as much milk and butterfat as the 23,000,000 are now producing.

J. E. DORMAN, *Bureau of Dairy Industry.*

**D**AIRY Herd-Improvement Records Show Value of Increased Output Per Cow A study of the yearly individual records of 233,200 cows on test in dairy herd-improvement associations for the testing year ended in 1930 shows that as production of milk per cow advanced from the lowest-producing groups to the higher-producing groups, the profits per cow increased at a very rapid rate.

Table 5 shows the comparative cost and returns of increased production for the groups of cows whose average yearly milk production per cow was 4,000, 8,000, 12,000, and 16,000 pounds.

TABLE 5.—*Relation of milk production to other factors*

Group No.	Milk production per cow	Feed cost per 100 pounds of milk	Yearly feed cost per cow	Yearly income over feed cost per cow	Returns per dollar spent for feed
	<i>Pounds</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
1.....	4,000	1.47	60.00	55.00	1.92
2.....	8,000	.99	79.00	115.00	2.46
3.....	12,000	.84	101.00	167.00	2.65
4.....	16,000	.83	132.00	239.00	2.81

The average feed cost for the group of cows that produced 4,000 pounds of milk per cow in one year's time was \$1.47 per 100 pounds of milk, while the feed cost for those that produced 8,000 pounds was 99 cents; for those that produced 12,000 pounds it was 84 cents, and for those that produced 16,000 pounds it was only 83 cents per 100 pounds of milk. In other words, as production per cow advanced from 4,000 pounds of milk to 16,000 pounds of milk, the cost of feed per 100 pounds of milk was reduced almost one-half. These figures give some idea of what may be saved in feed alone by increasing the production per cow. The dairy herd-improvement association figures do not give labor costs and overhead expenses, but the cost of labor and the expenses of overhead should not be much greater for the high-producing cow than for her low-producing sister.

#### Feed Costs Per Cow

While the feed cost per 100 pounds of milk went down from group to group as production increased, the yearly feed cost per cow went the

other way. For the group whose average milk production was 4,000 pounds the yearly feed cost per cow was \$60; for the group averaging 8,000 pounds the average feed cost was \$79; for the group producing 12,000 pounds it was \$101, and for the group producing 16,000 pounds it was \$132. These figures indicate that a cow producing 16,000 pounds of milk in a year eats more than twice as much feed as the cow that produces 4,000 pounds. Yet her production is so much greater that in spite of the increased cost of feed she returns a much larger yearly income over cost of feed.

The yearly income over cost of feed for the cows whose average milk production was 4,000 pounds was \$55 per cow. The group having an average milk production of 8,000 pounds returned \$115 in income over cost of feed. The group whose average production was 12,000 pounds returned \$167 in income over cost of feed, while the group whose average milk production was 16,000 pounds returned \$239 a year per cow in income over cost of feed. As it is usually considered that the feed cost of keeping the average cow a year is just about equal to the cost of labor and overhead, we may conclude that the cows having an average milk production of 4,000 pounds a year per cow just about paid for their feed, labor, and cost of overhead. In other words, they just about broke even. If that is true, it is safe to assert that all cows falling below the yearly production of 4,000 pounds of milk per cow in these dairy herd-improvement associations were actually carried at a loss and even in the dairy herd-improvement associations there are still many cows that fall below that low level of production.

### Returns Per Dollar Spent for Feed

Figures showing the returns per dollar spent for feed are quite significant. Table 5 shows that cows producing an average of 4,000 pounds of milk a year per cow returned \$1.92 per dollar spent for feed, while those that produced 16,000 pounds of milk per cow returned \$2.81 per dollar spent for feed. Low-producing dairy cows are not a good market for the feed grown on dairy farms, but high-producing dairy cows always constitute a good market for home-grown feeds.

Every dairyman should manage in some way to get production, feed cost, and income records of each cow in his dairy herd. He will find it profitable to study these individual cow records because they enable him to determine which cows should be kept and which should be discarded. Of all the figures in the table he will be most interested in the yearly income over cost of feed per cow. That figure means much more to him than the yearly cost of feed per cow or the returns per dollar spent for feed, because there can certainly be no profit until the returns pay for feed, for labor, and for overhead. To be sure, there are returns from the dairy herd other than those obtained from the sale of dairy products. For example, a certain value must be allowed for the manure and for the calf, but it costs something to haul the manure to the field and it costs something either to veal the calf or to raise it to production age. Therefore the dairyman would do well to step the production of his dairy herd up to the point at which the income from the sale of dairy products will pay all costs and leave a fair net profit.

J. C. McDOWELL, *Bureau of Dairy Industry.*

**D**ATE Industry of U. S. is an Example of New, Noncompetitive Crop Date palms have been growing in Florida, Texas, and California ever since the Spanish pioneers settled those regions, but unfortunately all the early plantings were made by sowing seeds. About half of the seedlings were male palms, and only a few of the bearing palms yielded fruit of high quality. Nevertheless, seedling date palms made so good a showing in California, Arizona, and Florida that active interest in the date as a new fruit crop began to develop early in the eighties of the last century.

In consequence of this interest the United States Department of Agriculture secured by correspondence offshoots of Old World date palms from Algeria, Egypt, and Arabia in 1889 and 1890 and sent them to California, Arizona, and New Mexico for testing in cooperation with the agricultural experiment stations of those States. Unfortunately these offshoots proved to be mere seedlings, mostly of little value. However, some of them made so rapid a growth and bore such abundant crops of dates that interest in them as a new fruit tree became still keener.

In 1900 a specialist of the United States Department of Agriculture went to the Algerian Sahara and selected several hundred offshoots of the choicest varieties grown there. These offshoots included a score of varieties, among them the famous Deglet Noor date, then and now the most highly esteemed date in the European markets. Most of these offshoots were planted in the Cooperative Date Garden at Tempe, Ariz., and a few dozen were sent to California in cooperation with the California State Experiment Station and with private growers. In the years immediately following (continuing to the present time) the Department of Agriculture made additional importations from the best Old World date regions, especially Mesopotamia, Persia, Beluchistan, Arabia, Egypt, Tunis, and Algeria. A cooperative date garden was established in California in 1904 and later another in Texas. Soon scores of the best date varieties of the Old World were growing vigorously in the hot, dry irrigated valleys of the southwestern United States.

#### Climatic Requirements Indicated

A careful study was made in the Old World and in the New to determine as nearly as possible the life-history requirements and physiological limiting factors of the date palm. The findings were given wide publicity in order to prevent, in so far as possible, the loss of time and money that would result from planting date varieties in soils or under climatic conditions unsuited to them. These studies showed that the date palm required such a hot, dry climate to mature its fruit that large-scale commercial date culture was possible only in the hot irrigated valleys of southern California, southern Arizona, extreme southern Nevada, and southern Texas. (Fig. 37.)

It soon became evident that very few of the many choice Old World varieties were adapted to culture in this country, and the promising ones needed prolonged and very careful study before they were sufficiently understood to justify being grown on a commercial scale.

About 10 years after the first offshoots had been planted a few varieties began to show decided promise of succeeding here. The Deglet Noor was one of these, but good fruit of this variety was not produced in commercial quantities until the twelfth year after the offshoots had

been planted. New methods of curing Deglet Noor dates were developed by the date specialists of the Arizona Agricultural Experiment Station and the United States Department of Agriculture, and these enabled American date growers to produce fruit that equaled or even surpassed that grown in the Old World. Thereupon a farmers' cooperative date association was formed, with the assistance of the Department of Agriculture, to import offshoots of this and other varieties, and interest in commercial date culture grew very rapidly. Stimulated by the active interest in date culture, a private nursery company made large importations of date offshoots from Mesopotamia, Arabia, and several other date-growing countries in the Old World from 1912 to 1914.



FIGURE 37—Fourteen-year-old Deglet Noor date palms in full fruit in a private garden near Indio, Calif., October, 1930. Adjustable picking platforms are attached to the palms, and on most of the bunches the fruit is protected by burlap coverings.

### Only a Few Varieties Commercially Established

Little by little one date variety after another was studied thoroughly enough so that its culture could be undertaken with reasonable assurance of success. In this pioneer work the contributions made by experts in charge of private date-packing houses were of decisive importance. In spite of many years of study, not over a dozen varieties out of more than 100 that have been introduced from the Old World are known well enough to be safe for planting on anything more than a dooryard scale. Only half a dozen are grown on an acreage basis, chiefly Deglet Noor, Halawy, Khadrawy, Zahcedy, Hayany, and Saidy. A few other varieties that enjoy a high reputation in the Old World, such as the Barhee, Khalasa, Maktoom, and Dairee, are planted on a small commercial scale. Still others, famous in the Old World,

that have made a good showing here are still so scarce that it will be many years before even small commercial plantings can be made of them. (Fig. 38.)

As a result of the cooperation of alert and intelligent American date growers, expert date packers, and scientific experts, such rapid progress has been made in the culture of the date palm and in the handling of its fruit that it can be safely asserted that more has been done to improve date culture in this country in the last 25 years than has been accomplished by the Old World date growers in the last 25 centuries.



FIGURE 38.—Young Deglet Noor date palms growing near Indio, Calif., October, 1930. The palm in the foreground carries about 15 bunches of fruit protected with burlap coverings. (Photograph by Avery Edwin Field)

### A Noncompetitive Crop

The date industry in the United States is an excellent example of a new and noncompetitive crop and as such merits attention when many crops are grown in quantities so large as to be difficult to market. Every acre of irrigated land in the Southwest planted to dates is taken out of competition with the orchard and field crops of this country for a long period, probably permanently. The United States imports from 50,000,000 to 80,000,000 pounds of dates annually, and in spite of the rapid growth of date culture in the hot irrigated valleys of southeastern California and southwestern Arizona, the domestic production of dates is only between 2,000,000 and 3,000,000 pounds. Continued healthy growth of date culture is almost certain to lead to the production within the next decade of an appreciable tonnage of choice, well-cured, home-grown dates. These will be so attractive in appearance that they will readily gain a place at the banquet table and so clean and of so delicious a quality as to hold the favor of all who taste them.

WALTER T. SWINGLE, *Bureau of Plant Industry.*

**D**ATE Ripening Controlled Beneficially by Using Special Kinds of Pollen      The time of ripening of all fruits has been believed to be entirely a matter of variety as affected by environmental relations of climate, soil, and culture. It is now known that in the case of the date palm there is, within certain limits, a direct effect of pollen on the time of ripening of the fruit.

Conclusive proof of this new and unexpected influence of the pollen parent on the fruit tissues belonging to the mother plant was obtained in 1925. This effect has been called *metaxenia*.

The experiments have since been continued in commercial date gardens in the Coachella Valley in California and in the Salt River and Gila Valleys in Arizona, always with the same results. The effects of the pollen of more than 100 different male date palms have been studied in this way. Most of these male palms produced pollen causing the fruit to ripen in midseason. A few males caused very early ripening of the crop and a very few late ripening.

In most plants such an influence would have only scientific interest and value, but in date culture artificial pollination is commonly practiced, owing to the fact that the pollen is produced on a different plant from the one that produces the fruit. Very early in the evolution of date culture there developed the practice of maintaining only a few male palms, the pollen of which suffices for a large number of females.

Pollen from a male date palm known to cause early ripening was applied in 1930 to one group of Deglet Noor palms and that causing late ripening to another comparable group, and a record was kept of the fruit as picked from each. At the United States Experiment Date Garden at Indio, Calif., the difference in time of ripening was 15 days at the beginning of the season, increasing to 20 days when 98 per cent of the crop was ripe. At the Indian Wells district, a few miles away, where the normal ripening is somewhat later, there was a difference in time of ripening of 21 days at the beginning of the season, increasing to 37 days when 98 per cent of the crop was ripe.

### Practical Value of the Discovery

As would be expected from this record, it has proved possible to utilize pollen causing early ripening to insure the ripening of late varieties in regions having too short or too cool a summer to permit the dates to mature properly. On the other hand, pollen causing late ripening is used to delay ripening of dates in regions having an excess of summer heat when the crop tends to ripen too early, as in the hotter parts of the Coachella Valley in California, now the chief date-producing region in the United States.

Date palms in the Southwestern States produce from 8 to 20 flower clusters over a period of 8 to 10 weeks in early spring, and the ripening period of the fruit bunch extends about 6 to 10 weeks, depending on the variety and on the temperature prevailing during the ripening season.

A new application of the effects of pollen in controlling the time of ripening of dates was tested in 1930. Pollen from two different male palms known to exert very diverse effects on the time of ripening of the fruit was used on a single bearing date palm. This differential pollination, as it may be called, was carried out by applying pollen known to cause late ripening to the first flower clusters to open in spring, and

pollen known to cause early ripening to the later blooms. The effect of this method of pollinating was to shorten decidedly the ripening season of the dates. When the two kinds of pollen were applied in reverse order, viz, early-ripening pollen to the first blooms and late-ripening pollen to the late blooms, the reverse effect was secured and the ripening season was decidedly lengthened.

### Late Ripening Beneficial in Some Areas

The fruit of the Deglet Noor variety, the chief commercial date in this area, which matures during the extreme heat that prevails during the latter part of August and the first three weeks in September, is distinctly inferior in keeping quality and in flavor to fruit maturing in October and November, when the weather is much cooler and ripening less rapid. In most parts of the Coachella Valley a considerable proportion of the crop is harvested by the last of September, and under such conditions the exclusive use of pollen that causes late ripening is beneficial. However, in the Indian Wells district, the custom of using pollen that causes late ripening delays the beginning of the harvest until about the first of October, but the exclusive use of such pollen here throws the ripening of the latter part of the crop into December and January, and even into February. Prolongation of the ripening season into winter greatly increases danger from rain, as most of the precipitation occurs at that season; and because of the slowness with which fruit ripens in cold weather such prolongation results in a decided slowing up of the harvest with consequent greater expense in handling the fruit. The use of differential pollination to shorten the ripening period thus becomes of particular practical significance in date culture in this district, eliminating undesirable early fruit on the one hand and speeding up the ripening of the later fruit on the other hand, so as to reduce substantially the loss from late rains and a prolonged harvest.

The reverse form of differential pollination, which lengthens the ripening season by the use of pollen known to cause early ripening on the early blooms and late-ripening pollen on the late blooms, promises to prove advantageous in regions where sudden autumnal rains injure or destroy all dates in the final stages of ripening.

In marked contrast to most technical improvements in agriculture, differential pollination entails no extra cost to the grower. All that needs to be done in order to reap the advantages that have already been demonstrated is to change from one kind of pollen to another when about half of the flower clusters have opened.

ROY W. NIXON, *Bureau of Plant Industry.*

### DOGS and Cats May Be Kept Off Flower Beds by Nicotine Sulphate

Dogs and cats sometimes become obnoxious about certain premises by running over flower beds, ruining shrubbery, and invading areas where they are not wanted. It is not always possible to drive away the intruders before damage has been done, and fencing is often undesirable. Many persons appeal every year to the department for some harmless means of repelling the animals without injuring either them or the shrubbery and flower beds.

The Bureau of Animal Industry has been suggesting the use of a nicotine sulphate spray to solve this problem, and the reports received from those who have used it indicate that it is very effective. Dogs and cats find the odor of nicotine very repulsive, and since their sense of smell is very much keener than that of man it is possible to use the compound in such high dilution that it is inoffensive to any person.

Nicotine sulphate is widely used as an insecticide and when it is properly diluted and applied, it is beneficial to plants and not injurious to buildings, walls, or walks. It may be obtained at seed and fertilizer stores in packages labeled with directions for diluting and applying. If the premises are sprayed with the dilute solution, dogs and cats will avoid the neighborhood of the sprayed areas. The odor will repel them.

The spray evaporates in time and will be washed off by rain; consequently, it should be renewed about once in two weeks and after heavy or long rains. Livestock should not be permitted to graze on vegetation that has been sprayed with nicotine sulphate.

JAMES F. COUCH, *Bureau of Animal Industry.*

## DROUGHT Losses of 1930 and 1931 Indicated by Crop and Income Data

Crop production in 1931 was adversely affected by drought in the spring-wheat States of North Dakota, South Dakota, and Montana and in adjacent areas in Minnesota, Nebraska, and Wyoming. In South Dakota a severe grasshopper infestation due to the unusually mild winter of 1930-31 combined with the drought to reduce crop production to the lowest level in years. Distress among the farming population of these States and among those who depend upon the farm trade for their livelihood was most severe in Montana, northern Wyoming, and western North Dakota, where drought had also occurred in 1930. The great drought area of 1930 in the Potomac, Ohio, and lower Mississippi River Basins produced larger than average crops in 1931.

Figure 39 indicates the extent of the 1930 drought. The most severely afflicted area extended from southern Pennsylvania, Maryland, and Virginia to southern Kansas on the north, Alabama on the south, and Texas on the west. In a separate area comprising a large part of Montana and portions of North Dakota and Wyoming, production in 1930 was also severely limited by drought.

The figure indicates relative conditions on about August 20, when the drought was near its peak. In some parts of the area relief came in time to improve somewhat the final outturn. In other areas the drought continued unabated until late autumn. The relative severity of the drought in 1930 is indicated by the composite yields per acre of crops expressed as a percentage of the 1919-1928 average yields. In order, these percentages are as follows: Kentucky, 60.5 per cent; Arkansas, 62.8; Missouri, 66.8; Virginia, 67.7; Oklahoma, 71.2; Montana, 70.4; Maryland, 73.4; Tennessee, 75.6; Ohio, 79.3; Illinois, 83.1; Indiana, 84.7; Texas, 86; Pennsylvania, 87.6; Mississippi, 91.5; Louisiana, 100.3; and Alabama, 111.3.

The figures quoted are averages by States and consequently do not reflect the full severity of the drought in the areas affected. Portions of such States as Ohio, Indiana, Illinois, Texas, Louisiana, and Ala-

bama were not in the extreme-drought area. Furthermore, the cotton crop in Louisiana and Alabama withstood the drought in a surprising manner. Consequently, in those States the composite yields for each State as a whole do not reflect the reduction in crop production in the portions adversely affected by the drought.

### Damage to Various Feed Crops

The loss in crop production due to drought in 1930 was most serious for corn, sorghums, and hay and was less serious for the other feed crops—oats and barley. Winter wheat, rye, and many of the vegetable crops were largely harvested before the drought became severe. The main spring-wheat area of Minnesota and the Dakotas and the principal potato-producing sections were outside the drought area. Corn production in the United States fell to 77.1 per cent of the 1925–

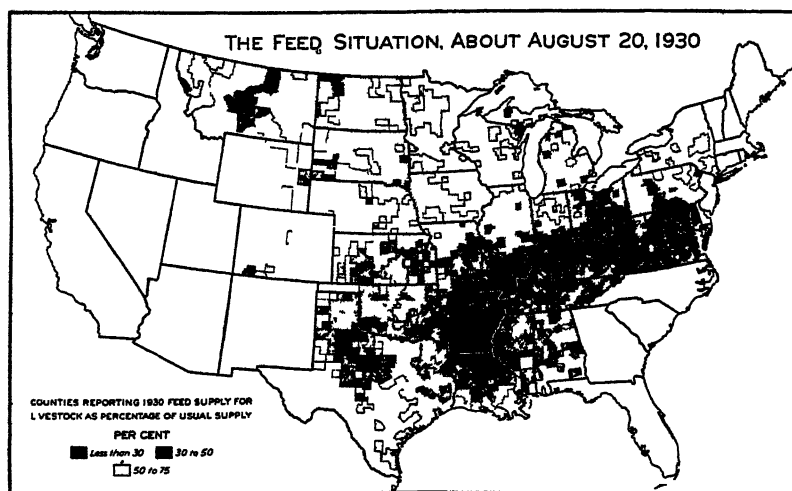


FIGURE 39—Drought of 1930 affected crop production in many States and was particularly severe in an area from southern Pennsylvania, Maryland, and Virginia on the east to central Kansas on the north, central Texas on the west, and western Alabama on the south. An area in central Montana and western North Dakota also suffered

1929 average and hay to 88.5 per cent; oats production in the United States was 2.2 per cent above average; and barley, as a result of rapid expansion of acreage, was 35.4 per cent above. There was, however, a serious shortage of these crops in the drought area. Wheat production was 2.1 per cent above average; rye, 1.2 per cent below; cotton, 6.3 per cent below; potatoes, 8 per cent below; and tobacco, 16 per cent above.

Pastures for livestock were scant for many weeks. For the entire 1930 pasture season, pastures in the drought States were from 50 to 80 per cent of the 10-year average. Poor pastures during the summer months and short supplies of grain and hay greatly affected the production of animal products in the latter half of 1930. Thus, on August 1 milk production per cow in those States averaged 11.3 per cent below production on the same date in the previous year and egg production per hen averaged 9.5 per cent lower. In spite of somewhat curtailed production during the drought months, however, the production of

milk and eggs, both in total per cow and total per hen, for the full year 1930 was quite generally above or very close to the average of the 5-year period 1925-1929.

A mild autumn and winter greatly reduced the requirements for feed for livestock and the meat supply of 1930 appears not to have been seriously affected. Production of beef was 3 per cent above average; of calves (veal) 1 per cent below; and sheep and lambs 10 per cent above. Production of hogs was 6 per cent below the 1925-1929 production. This decrease was not entirely due to the drought but rather to declining hog numbers on hand when the drought began.

The decreased production of farm products in 1930 is reflected in the reduced farm income in the drought-stricken States. Although a considerable percentage of the reduced income in 1930 was due to the lower prices that accompanied the world-wide business depression, a

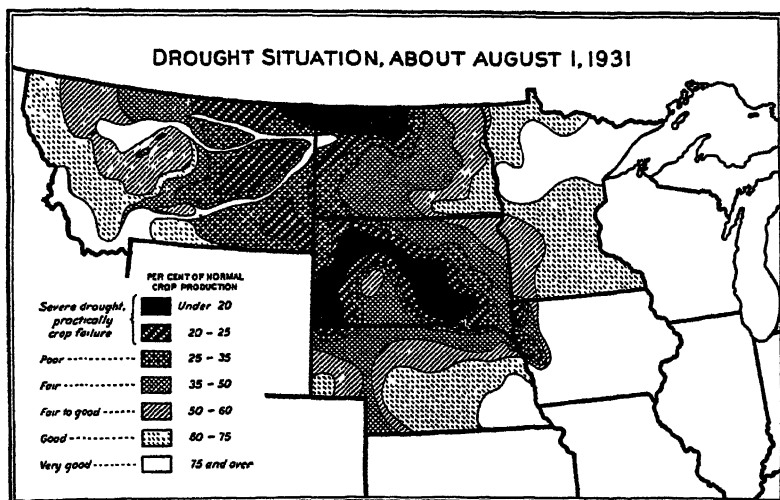


FIGURE 40.—Drought of 1931 was largely confined to the spring-wheat States of the Northwest, with contiguous areas in Idaho, Nebraska, and Wyoming. Parts of Montana, North Dakota, and Wyoming suffered in both 1930 and 1931.

material part of the reduction in the drought area was brought about by decreased quantities of agricultural products available for sale or family consumption. Gross income in this group of States varied from 54 per cent of the 5-year average in Arkansas and Oklahoma to 85 per cent in Indiana, whereas gross income for the United States as a whole was 84 per cent of average.

### 1931 Drought Less Extensive

The drought of 1931 was more limited in area. Figure 40 shows its extent and effect upon crop conditions on August 1. Crop deterioration continued unabated until the coming of winter. The composite yields of crops in North Dakota were 55 per cent of the 10-year average yield; in South Dakota, 43 per cent; and in Montana, 54 per cent. In addition, about 18 per cent of the planted crop area was an entire failure in South Dakota, 22 per cent in North Dakota and 35 per cent in Montana. Production of practically every crop grown in those States

was less than half of average. Because of their importance in the production of spring wheat and flaxseed, the production of these crops in the United States was the lowest in many years. The spring-wheat crop was 40 per cent of the 1925-1929 average; the flaxseed crop, 54 per cent. The scarcity of both food and feed crops in those States necessitated a very considerable out-movement of livestock, particularly sheep and beef cattle, from the ravaged sections. The composite condition of pasture during the entire 1931 pasture season in South Dakota was 55.9 per cent of the 1921-1930 average; in North Dakota, 61.3 per cent; and in Montana, 53 per cent. Production of milk per cow during the pasture season was low, but for the entire year in North Dakota was 106.3 per cent of the 1925-1929 average; in South Dakota, 109.2 per cent; and in Montana, 100.8 per cent. Egg production for the year was 103.9, 107.2, and 106 per cent, respectively, of the 1925-1929 average in those States. High production in the early and late months of the year more than offset the low production of the summer months.

With greatly reduced quantities of crops available for sale and prices that were even lower than the low prices of 1930, the income of farmers in the 1931 drought area was seriously curtailed. It seemed likely that income in those States would be less than 30 per cent of the 1925-1929 average.

JOSEPH A. BECKER, *Bureau of Agricultural Economics.*

## **D**RY Farming Calls for Native Pastures as an Important Adjunct

The history of dry-land farming is closely associated with that of the livestock industry, especially in the Great Plains area. With the introduction of dry-farming tillage methods, much of the native range was broken up, and its value as range land was destroyed. Some of the land that was broken up might better have been left in native sod and utilized as native pasture. A great deal of good native range was converted into poor dry farms.

Native pastures are an important adjunct of the dry farmer, for without them many dry farms would be of little value. The value and importance of native pastures in dry-land farming are not given due consideration in the farming scheme. The native pasture is usually the hardest-used piece of land on the farm. Within recent years native pastures are becoming better understood as an integral part of the dry-land farm.

Since 1915 the United States Department of Agriculture in cooperation with the North Dakota Agricultural Experiment Station has been investigating near Mandan, N. Dak., the problems connected with the utilization of native pastures on the dry-land farm.

The native vegetation in this area forms a comparatively dense sod and covers from 60 to 65 per cent of the ground. A large percentage of the feed for grazing animals is furnished by blue grama grass, western needle grass, and prairie June grass.

The cattle used in the grazing experiment are 2-year-old grade steers of the standard beef breeds. The period of grazing is five months, or from May 15 to October 15.

The first problem was to determine with some degree of accuracy the grazing capacity of the native range as it existed in this section. The

next step was to work out methods of pasture management that would afford the native vegetation an opportunity to produce its maximum amount of forage.

Pastures of 100, 70, 50, and 30 acres are grazed with 10 steers each. The 100-acre and the 70-acre pastures furnish enough feed to allow the cattle to make maximum gains for the five months. The steers in these pastures gain on the average approximately 300 pounds per head. About one-third of the total gain is made in June, with decreasing amounts each month to the end of the season. The pasture that is grazed at the rate of one steer to 10 acres is larger than necessary, but that grazed at the rate of one steer to 7 acres furnishes the right amount of forage for a system of continuous grazing on the ordinary dry farm in that section of the Plains.

#### Five Acres to One Steer Not Enough

The 50-acre and the 30-acre pastures do not furnish enough feed to allow the cattle to put on the gains of which they are capable. The steers grazed at the rate of one steer to 5 acres gain about 240 pounds in the 145 days during which their pasture will support them. The steers grazed at the rate of one steer to 3 acres gain 170 pounds in the 114 days during which the pasture will carry them. Both pastures are overstocked, as indicated by the low gains of the steers and by an increase in undesirable plants in the pastures.

Native pastures are too often grazed like the 30-acre pasture. The remedy for such overgrazing is more native pasture, a different system of grazing, less stock, or cultivated pastures to supply early-season grazing.

A 70-acre pasture divided into three parts and grazed by a deferred and rotation system carries one steer to 5 acres through the season without injury to the native vegetation and allows an average gain of 270 pounds.

Cultivated pastures of brome grass, crested wheatgrass, or sweet-clover have a high carrying capacity in the early season and can be used to advantage to supplement the native pasture. They should be grazed early in the season and the native pasture later in the season.

The dry-land native pasture too often is not given an opportunity to produce its maximum quantity of feed because of too heavy grazing which gradually weakens the vegetation and causes a marked decrease in yield.

J. T. SARVIS, *Bureau of Plant Industry.*

## **D**RY Farming in Extensive Operations Mainly Uses Crops of Low Acre Value

Crops may be adapted to or find their place in dry farming for different reasons—some because they are drought resistant or drought evasive, some because of comparative freedom from disease or insect pests, and others because of economies of production. Production on dry land is limited by the quantity of water that is available. Dry-land crops in general, therefore, are those of comparatively low acre values that lend themselves to efficiency and economy of production.

Wheat is perhaps the widest and most generally grown dry-land crop. It is fairly drought resistant and economic in its use of water, and its early maturity enables it to make the fullest use of water stored

in the soil before it is seeded. Since wheat has both winter and spring varieties, few if any other crops are adapted to a wider range of conditions or are relatively more productive. Dry-land wheat is of the highest milling and baking quality.

Oats and barley are standard dry-land feed crops in the northern and central Plains, but south of central Kansas they are grown only when early spring rains occur and other seasonal conditions seem favorable. In some localities barley is the most productive grain that can be grown.

Rye occupies a smaller acreage but is an important crop in North Dakota, Montana, South Dakota, and Nebraska. Both winter and spring varieties are grown. Winter rye is hardier than winter wheat and finds a place where conditions are too severe for the latter crop to survive.

Except for the flaxseed grown in a few counties in southeastern Kansas, practically all that of the United States is grown in the northern Plains and adjacent prairies.

Beans are an important dry-land crop in Colorado and New Mexico, and their production is rapidly increasing in other States except where the frost-free season is very short. Cheapness of production as a result of freedom from disease is a strong factor in giving beans a place among the dry-land crops. They are also a good rotation crop with wheat.

#### Sorghums Are Drought Resistant

Sorghums of various kinds constitute the feed crops and some cash crops from central Kansas southward. The sorghums are drought resistant and very efficient in their use of water. They are of five general classes: (1) Milos and feteritas, dry stemmed and grown for the grain; (2) kafirs, juicy stemmed and yielding grain and forage; (3) sorghos, or sweet sorghums, with sweet, juicy, leafy stems, used for hay, forage, and silage; (4) Sudan grass, grasslike and leafy, giving hay and pasture; and (5) broomcorn, from which the brush is used for the manufacture of brooms. The stover is sometimes utilized for feed. Sorgho and Sudan grass range much farther north than the other sorghums, and they are of some importance up to the northern boundary of the United States or beyond.

Corn is a widely distributed dry-land crop, but except in a few sections is a distinctly minor one. In the primitive culture of the Indians it was and is a staple crop even under conditions of extreme aridity. As a dry-land field crop it is reasonably certain to produce a fair-to-good tonnage of feed but may fail to set ears. It is of most importance in the central and northern Plains, where it is used as a rotation crop with wheat and other small grains.

Cotton has become firmly established as a dry-land crop well adapted to the Plains region of Oklahoma, Texas, and New Mexico. Making its growth late in the season, it is able to make efficient use of the rainfall. Abundance of sunshine brings an early and uniform ripening, and in this region it is free from many of the insect and disease enemies occurring in more humid regions.

Cowpeas in southern sections and field peas in northern sections are annual legumes grown for feed. Soybeans and peanuts are less extensively grown.

Millet and prosos have a small but important place, chiefly as catch crops for hay and seed.

Cultivated perennial hay crops are of low general adaptation to dry farming, but in the Northern States with spring rainfall alfalfa, bromegrass, crested wheatgrass, and slender wheatgrass are reasonably sure and productive, but do not lend themselves to short or medium-length rotations. Biennial sweetclover is of much wider adaptation and promise as a rotation crop.

With proper care and the selection of favored sites, adapted trees, fruits, and most common garden vegetables can be raised for the protection and ornamentation of the dry-land home and for home consumption.

E. F. CHILCOTT, *Bureau of Plant Industry.*

## **D**RY Farming in Pacific Northwest is Based on Grain and Clean Fallow

The dry-farm areas of the Pacific Northwest include most of the tillable land east of the Cascade Mountains in Oregon, Washington, and northern Idaho. The topography, elevation, soil, and climatic conditions differ widely in this area. The typical dry-farmed soils are mostly sandy or silt loams and are located in sections where the average annual precipitation ranges from 8 to 18 inches.

As in other dry-farmed sections, the annual precipitation and its distribution throughout the year are the most important limiting factors in crop production. In some areas the availability in the soil of sufficient nitrate nitrogen for the plants also is of much importance.

Unlike the dry-farmed area of the Great Plains, where most of the precipitation occurs during the spring and summer months, most of the precipitation in the Pacific Northwest occurs during the late autumn, winter, and spring months. This difference in the distribution of the precipitation not only influences the crops that can be grown profitably, but also makes changes in tillage practices necessary.

Because of lack of rainfall during the growing season, late-maturing crops such as corn are not so well suited to the Pacific Northwest as are the cereals and other crops that ripen early enough to escape the hot, dry summer weather. Winter wheat is the most widely grown and most profitable crop, spring wheat ranking second, and barley third. The most popular winter-wheat varieties are Turkey and Hybrid 128. For spring sowing Baart and Federation are the leading varieties. The most promising legumes are those that mature early. In the higher-rainfall sections field peas are commercially grown in a rotation with wheat.

Farm practice usually is the outgrowth of necessity. Successful crop production on the dry lands of the Pacific Northwest is based on alternate crops of grain and clean fallow. The experience of farmers and the results of investigations on several experiment stations in this area justify the conclusion that the alternate raising of grain and fallowing is the safest and most profitable method of crop production where the precipitation is less than 15 inches. Where the precipitation is higher, crop rotation is practicable.

### **The Controllable Factors**

Of the controllable factors that influence yields, the preparation of the fallow has been found to be one of the most important. To maintain a good fallow the following points are essential:

(1) The land should be left with stubble standing during the winter. This aids in holding the snow and in moisture absorption. Fall disking or fall plowing is not advisable. The stubble should not be burned, but should be plowed under, thus adding some organic matter to the soil and helping to prevent erosion.

(2) Land should be plowed early in the spring or when there is enough moisture to plow easily and well. If plowed late in the spring, land should be disked early enough and thoroughly enough to prevent all plant growth.

(3) After plowing, cultivation enough to keep the land free from weeds is all that is needed. The best implements for this purpose have been found to be spike-tooth harrows, spring-tooth harrows, and blade or rod weeders.

The combined harvester, a machine that has been in general use in the Pacific Northwest for more than a quarter of a century, has practically replaced all other machines for harvesting cereals. Its use in harvesting is particularly well suited to this region and is the most economical and efficient method yet devised. The use of tractors, for both tillage and harvesting operations, has greatly increased during the last 10 years, those of the caterpillar type being most popular because of being better suited for working on hilly or rolling land.

D. E. STEPHENS, *Bureau of Plant Industry.*

**D**RY-FARMING Practices Determined by Climatic and Soil Conditions The term "dry farming" was first used in the irrigated districts of the West to designate farming without irrigation in a section where irrigation was generally practiced. The term was used later in some semi-arid sections to distinguish the activities of the man who cultivated the soil and sowed crops from the activities of the rancher whose livestock pastured on the native sod. The use of the term has been extended to sections that have no irrigation, and it has come to mean specifically the production of crops without irrigation in regions of deficient rainfall. But as the rational development of this activity has in many sections compelled the keeping of livestock to consume all or a portion of the crops produced, the use of the term has broadened until it has come to mean farming without irrigation under dry conditions. Aside from the exclusion of irrigation, it does not apply to a method of farming, but is descriptive of the conditions under which it is done. In the United States its use is generally limited to sections having an average annual precipitation of less than 20 inches and in the northern tier of States, where temperatures and evaporation are low and the season short, of less than about 16 inches.

Dry-farming conditions in the United States are found in the Great Plains, lying between the ninety-eighth meridian and the Rocky Mountains, and in the intermountain valleys and plateaus to the westward. The largest dry-farming areas in the intermountain region are located in the Great Basin, the Columbia River Basin, and the Snake River Basin.

The factor that distinguishes dry farming from farming in more humid regions is the limited water supply. Differences in the quantities of water available are responsible for certain fundamental differences in the practices of the two regions or types of farming.

## Effects in Humid Regions

In humid regions more water enters the soil than the vegetation that occupies it can remove. The excess water moves downward through the soil, leaching with it soluble salts and reducing fertility. As its downward passage is checked or retarded by more or less impervious soil or strata it accumulates to the point of saturation and is known as ground water, the upper surface of the ground water being known as the water table. Since there is an excess of water, there is no incentive to accumulate or conserve it. The aim is rather to have the ground occupied by a growing crop for as much of the year as possible. This affords a surface cover to prevent washing, and either furnishes economic return in the form of a harvested crop or checks the loss of fertility by taking it up in plants and returning it to the soil in green manure.

In arid and semiarid regions the amount of water that reaches and enters the soil is no more than sufficient for the current needs of the vegetation that occupies it. Seldom or never, depending upon the rainfall and soil of the area in question, does water penetrate beyond the zone occupied by plant roots. There is no downward passage of water beyond this zone, no leaching of the soil, and no accumulation of ground water or formation of a water table. The absence of a water table or the presence of a permanently dry subsoil may be properly considered as the feature that determines or distinguishes dry farming and makes its practices necessary. Water being the vital substance that is deficient or at least not present in excess quantity, its conservation and economic utilization become of primary importance in dry-farming agricultural practice.

The endeavor of the dry farmer, in contrast to that of the humid farmer, is to keep the land free of vegetation for as much of the season as is consistent with the production of crops. In its extreme form this may result in deferring cropping and maintaining a bare fallow for an entire year or longer. The object is to accumulate in the soil during this period of greater or less length a store of water to supplement as far as possible the insufficient amount that may be expected to fall while the crop is growing.

JOHN S. COLE, *Bureau of Plant Industry.*

## DUTCH Elm-Disease Survey Indicates This Disease Not Widespread in This Country

Careful laboratory cultures made by Curtis May at the Ohio Agricultural Experiment Station indicated the presence of the fungus *Graphium ulmi*, which in northern Europe is the cause of a serious disease of elms known as the Dutch elm disease. This determination was verified by Dr. Christine Buisman, a visiting Dutch plant pathologist, who was familiar with the diagnosis of the disease.

In cooperation with the Ohio Agricultural Experiment Station, the department instituted an immediate search for other trees affected with this disease. As a result of this search, up to October 15, 1931, seven trees affected with *Graphium ulmi* had been found in Cleveland and one in Cincinnati, Ohio. No authentic cases had been found elsewhere in the United States.

During the summer of 1930 the attention of the Department of Agriculture was called to wilting elm trees at Cleveland, Ohio.

The presence of the Dutch elm disease is indicated by the sudden wilting of the leaves of a part of the crown of the tree, of the entire tree, or of the tips of some of the side branches. Drying and discoloration of the leaves and defoliation may follow. If a clean cut is made across an affected twig, a brownish discoloration is evident in the sapwood. This discoloration, as it appears in cross and longitudinal sections of infected elm twigs, is shown in Figure 41. The smaller of the two elms shown in Figure 42 was wilting and dying in July, 1931, when the trees were discovered. The larger tree had died suddenly in the summer of 1930, but it was not found until 1931. Discoloration of the *Graphium ulmi* type was evident in the 1930 and 1931 rings of wood of the smaller tree and in the 1929 and 1930 rings of the larger tree.

### Field Diagnosis Impossible

Unfortunately, field diagnosis of this disease is impossible.

In addition to *Graphium ulmi*, at least two fungi, and probably some bacteria, and possibly some bacteria, produce the same visible external and internal symptoms. Therefore, a cooperative Dutch elm disease laboratory has been established at the Ohio Agricultural Experiment Station to select from wilting elms discovered those whose trouble is really caused by this foreign parasite. There the parasites causing disease of this type are isolated from the specimens taken by State and Federal scouts or received from interested volunteer observers and are grown in cultures until the nature of the parasite is determined. In the two summer seasons of 1930 and 1931, up to October 15, 1931, cultures had been grown from about 850 trees showing suspicious symptoms, and of this considerable number of specimens examined, *G. ulmi* was present in eight only.

Since so few trees affected by the disease have been found in this country, it was manifestly unsafe to permit these trees to remain undestroyed and to conduct here experiments to determine the mode of transmission of the disease from tree to tree. Our knowledge of the movement of the disease is, therefore, based on observations made in Europe and reports received from there. Such study of this problem as has been made there indicates that the spores of the fungus are produced in cavities made by wood borers in the killed elm wood and on the exposed surfaces of dead wood. The wood borers themselves seem to be the active carriers from tree to tree. But carriage by such insects alone can not account for movement over long distances in Europe or for movement across the Atlantic Ocean barrier from Europe to America. In Europe the area covered by the disease has gradually expanded since its first discovery in the Netherlands in 1919, till it now extends

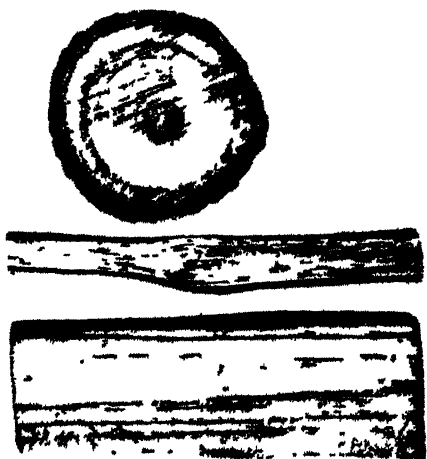


FIGURE 41.—Cross and longitudinal sections of branches of elm showing discolored woody tissue

from Norway on the north through Germany, the Netherlands, England, Belgium, and France to Italy. The movement of diseased nursery stock could effect the transfer from Europe to America, but since the establishment of Quarantine 37 on June 1, 1919, there has been almost no movement of elm nursery stock from Europe to the United States and not a single recorded case of its movement from Europe to Ohio. Under special permit for propagation, one shipment of keyaki (*Zelkova serrata*), a related and susceptible Japanese and Chinese tree, was made to the State of Ohio from England, but this occurred before the disease had appeared in Great Britain and the stock did not go to the localities where the Dutch elm disease has been found. None of

the diseased elms found in America has been traced to any nursery.

Since the fungus withstands drying, it is possible that it was brought to America on box lumber made from affected elm trees or on infected elm leaves accidentally included in goods shipped from an affected region. But there is as yet no evidence to verify such suggestions.

Various inoculation experiments and European experience indicate that the Dutch elm disease may attack the American elm (*Ulmus americana*), the English elm (*U. campestris*), the Holland elm (*U. hollandica*), the Scotch elm (*U. glabra*), and the nearly related keyaki (*Zelkova serrata*). Thus far inoculations made on the Chinese elm (*U. pumila*) have not produced the disease. In

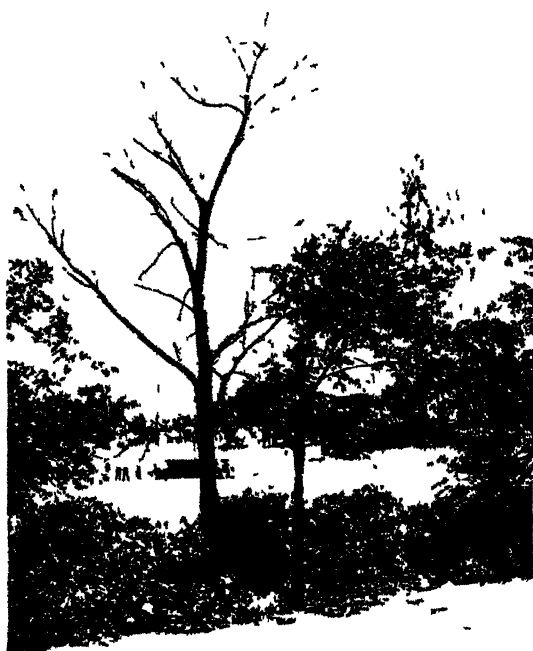


FIGURE 42—Two elm trees discovered in Cleveland, Ohio, in 1931. The larger had died in 1930, the smaller was dying when discovered

America there are several other species of elms whose susceptibility to this disease is being investigated.

#### Greater Part of Ohio Surveyed

During the growing seasons of 1930 and 1931 the greater part of Ohio was surveyed for this disease, especial attention being given to the immediate vicinities of the discovered infected trees at Cleveland and Cincinnati. Scouts were sent into the field by both the Federal Government and the Ohio State Department of Agriculture. Scouting trips were also made into Indiana, Illinois, Missouri, Kentucky, and West Virginia. Scouts and forest pathologists engaged in other parts of the country also searched for the disease. Descriptions of the trouble

were sent to interested persons in all parts of the country, and a gratifying response came from plant pathologists, foresters, tree surgeons, park commissioners, and lovers of trees in general.

While the outlook is bright and we may even hope that this disease, so serious in Europe, is in the United States purely local and confined to two points, yet it is not time to relax our vigilance. Elms are almost everywhere in the United States. Cooperative search for the disease alone can cover them. During the next growing season those interested in elms either as shade and ornamental or as forest trees are urged to watch them carefully for wilting accompanied by browning of the recent wood rings. Whenever such a case is discovered, the infected twigs should be cut, well wrapped, and mailed for diagnosis to the Dutch elm disease laboratory, Ohio Agricultural Experiment Station, Wooster, Ohio.

R. KENT BEATTIE, *Bureau of Plant Industry.*

**EGG Hatching Prevented by Certain Bone Defects of the Developing Embryo** One of the greatest sources of loss to the poultry industry is the failure of fully one-third of all the eggs incubated in the United States annually to hatch. Among the causes for this high proportion is the development in the growing embryo of certain bone defects which make hatching impossible. These defects may arise from faulty conditions of storage or incubation of the egg, from faulty nutrition of the hen that laid the egg, or from inheritance.

#### Defects Caused by Faulty Storage or Incubation

The two sides of the upper beaks of some embryos grow unequally because of the absence or lack of development of one of the eyes. The beaks of such embryos become crossed so that they are unable to pip. The upper beaks of other embryos are entirely lacking or are very small because of rupture of the brain during the first days of incubation. Defects such as these are sometimes caused by too high temperature—over 70° F.—of the room in which the eggs were stored before incubation. Other possible causes are an unduly low temperature immediately after laying, or too high or too low incubation temperatures.

#### Bone Defects of Nutritional Origin

Lack of sufficient vitamin D in the diet or lack of direct sunlight for breeding hens causes the bones of embryos developing in eggs produced under such conditions to be so soft as to prevent hatching.

Lack of sufficient, good-quality protein in the diet of breeding hens probably causes the condition called chondrodystrophy in the embryos developing in the eggs of some hens under such conditions. Embryos so affected have hard bones but the leg bones are bent sharply and the beaks are parrotlike. Such embryos do not hatch. A mixed animal-protein supplement, such as a combination of meat meal, fish meal, and dried milk, in the diet of the breeding hens, will prevent the condition.

#### Bone Defects of Hereditary Origin

Fowls of the "creeper" type, so called because of short or defective legs, carry an hereditary character that prevents the hatching of one-

fourth of the fertile eggs from matings among creepers. Adult creepers have very short legs but the embryos that are unable to hatch because of the inherited trait have almost no legs and die early in the incubation period. As far as is known, all creepers have this hereditary defect.

Another condition, called "stickiness" (fig. 43), prevents the hatching of about one-fourth the embryos in eggs from breeding stock in



FIGURE 43 —Left, a full-term "sticky" embryo, right, a normal embryo of the same age and ancestry

which this hereditary characteristic occurs. Fowls which transmit stickiness are perfectly normal in appearance. Sticky embryos fail to absorb the liquid in which every embryo is immersed until the eighteenth day of incubation, and consequently are sticky at hatching time. These embryos have very soft bones. Embryos not affected by hereditary stickiness sometimes fail to absorb this liquid, but such embryos have bones of normal hardness. An

abundance of vitamin D added to the diet of the breeding stock does not prevent hereditary stickiness. This objectionable quality, however, may be eliminated from flocks in which it is present by selecting for breeding only the offspring of fowls which produce no such embryos.

THEODORE C. BYERLY, *Bureau of Animal Industry.*

## EGG Size and Numbers Can Be Increased by Methodical Breeding

The need for a high average production of eggs to insure profitable returns from poultry flocks is generally recognized. Information from the Massachusetts, Ohio, California, and New York experiment stations, as well as from the United States Animal Husbandry Experiment Farm, Beltsville, Md., shows that income over feed costs rises as production increases. This information shows, likewise, that profits in poultry keeping are directly related to average egg production per bird. Since increased egg production for the flock is the most practical way of insuring profit, the fundamental importance of improving egg-laying ability can readily be seen. The poultry industry sustains a serious annual economic loss because large numbers of pullets fail to reach a profitable level of production and must be culled. On commercial poultry farms only about 50 per cent of the pullets are considered to be valuable enough to be retained for a second year.

The use of high-producing hens in flock matings tends to result in offspring of satisfactory laying ability, but consistent advancement seldom occurs unless a system of progeny testing is used which enables the poultry breeder to recognize breeding worth in individuals and

families. By persistence in testing the offspring of individual matings, he can develop a group of proved sires and dams to serve as a source of cockerels for improving future production. The trap nesting and pedigreeing entailed in methodical work of this kind help to disclose ability to transmit not only egg production but also egg size and hatchability and the constitutional vigor of individuals and families. Since these characteristics are hereditary, the selection of the more desirable birds can be carried on with increased efficiency. Good results will almost invariably be attained if careful records are kept and applied. Figure 44 shows a high-producing Rhode Island Red family developed at the United States Animal Husbandry Experiment Farm through progeny testing.

#### Body Conformation Not a Reliable Guide

The progeny test would be unnecessary and progress in breeding would be less difficult, if it were possible to select vigorous, high-producing stock by such external characters as body shape or head points. Several investigations have shown that live-bird measurements are of relatively little value in classifying birds on the basis of egg-producing ability.

Recent studies at the animal husbandry experiment farm furnished additional confirmation of this point, indicating that there is no significant correlation between head and body measurements of live birds and egg production in White Leghorns or Rhode Island Reds. Skeletal measurements of a small group of White Leg-

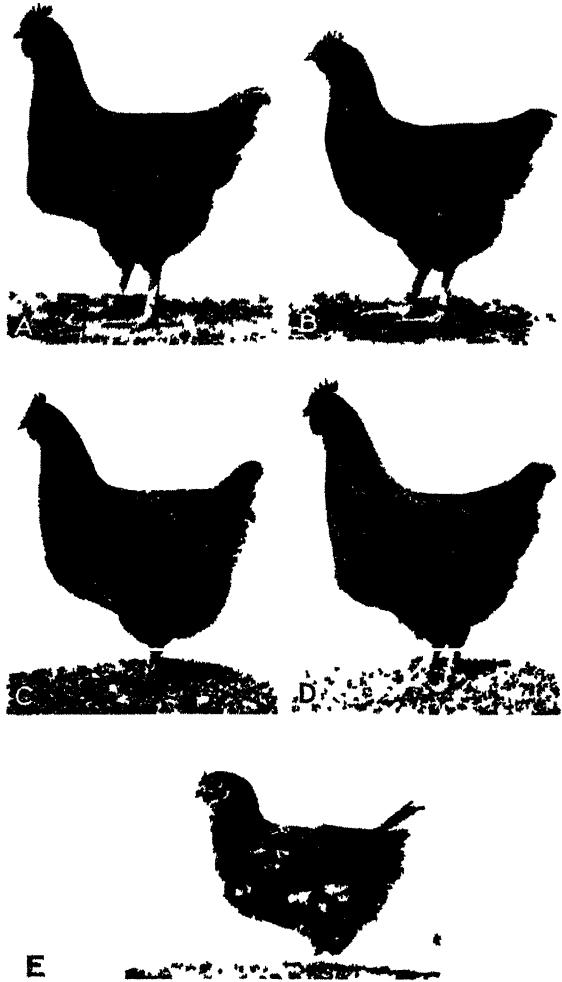


FIGURE 44 —High-producing Rhode Island Red family developed at the United States Animal Husbandry Experiment Farm, Beltsville, Md., through progeny testing. A, Foundation hen, No. 10011, produced 187 eggs in one year; B, hen No. 1795, daughter of hen No. 10011, produced 236 eggs; C, hen No. 5846, daughter of hen No. 1795 and granddaughter of foundation hen No. 10011, produced 232 eggs; D, hen No. 6268, granddaughter of hen No. 1795, produced 274 eggs; E, hen No. 2553, great-granddaughter of hen No. 1795, produced 310 eggs. Photograph of hen No. 2553 was taken October 20, 1931, when she was in heavy molt after 13 months' steady laying.

horns likewise failed to show any close correlation with egg production. Consequently, there seems to be little basis for the belief that, in the domestic fowl, body conformation is a reliable indication of egg-laying ability.

It is well known, however, that the ability of a bird to lay consistently at a high rate is unquestionably inherited, and, as already mentioned, hatchability and egg size are likewise inherited traits. The economic importance of hatchability is evident from the fact that one-third of all eggs incubated annually fail to hatch. From a breeding standpoint, a male with a large number of high-producing sisters and half sisters may often be disappointing in the number of progeny sired, because he carries factors for low hatchability. Likewise, a high-producing female may be unsatisfactory because of the poor hatching quality of her eggs. A high-producing hen is desirable for further use in the breeding pen if from 85 to 90 per cent of her eggs hatch and if she has 8 to 10 daughters of high uniform production.

### Large Production for Long Periods Is Sign of Vigor

The mode of inheritance of egg size has not yet been determined accurately because the factors affecting the mean weight of eggs during the first year of a hen's production are apparently numerous. The results of a few investigations indicate that small egg size is dominant over large egg size; therefore, the use of hens laying small eggs, or the use of their sons as breeders, should be avoided. Size of eggs is important because it is closely correlated with size of chicks hatched. Individual variations in size of egg may account for wide differences in amount of profit per hen. Eggs weighing less than 2 ounces should not be used for hatching.

Breeding for efficiency in both production and reproduction must be based also on vigor in the stock and freedom from disease. Sedulous care in feeding and management of the chicks will not be effective in overcoming the handicaps of inherited defects. A large production of eggs for long periods is an indication of vigor and chicks from vigorous stocks are relatively easy to rear. Annual replacement costs can be reduced when stock is capable of producing profitably for two years.

When a farm flock owner does not find it practicable to conduct trap nesting and progeny testing, an effective means of increasing flock-production efficiency is the purchase of pedigreed baby chicks or breeding males of known high-producing ancestry.

J. P. QUINN, *Bureau of Animal Industry.*

**E**GGs Oiled by Vacuum  
Carbon Dioxide Method  
Keep Better in Storage

Shell eggs are one of the most perishable of food products that are stored for long periods of time.

The eggs removed in November, December, and January, after several months of storage, generally have distinct "storage flavors," or weaknesses not present in fresh eggs. Many attempts to prevent this deterioration have been made.

Various preservative treatments have been suggested, some for eggs stored under refrigeration and some for those held at ordinary temperatures. In recent years, the use of colorless and tasteless mineral

oils to seal the shell pores and to prevent evaporation and other changes in eggs during storage has gradually increased.

In studying this method of preserving eggs it was found that the eggs could be better sealed and preserved if the oil was forced through the shell pores. Consequently the Bureau of Chemistry and Soils developed a new method of treating eggs which consists essentially in drawing out by means of a vacuum, a portion of the air normally present in the egg, coating the shell thinly with oil, and releasing the vacuum with carbon dioxide gas. The return to normal air pressure carries the oil into the shell pores and effectively seals them. Studies have shown that the oil does not penetrate to the inside of the egg, but remains between the shell and the membranes. As a large portion of the oil is drawn to the inner surface of the shell the eggs dry quickly and have a less oily appearance than eggs oiled by the ordinary methods. This is an advantage in handling and retailing.

### Acidity Important in Egg Quality

Acidity is important in maintaining egg quality. One factor which influences the amount of acid in shell eggs is the gas, carbon dioxide. This gas is lost through the pores of the normal egg; its loss causing a marked decline in acidity. In oiling shell eggs, the Bureau of Chemistry and Soils has found that releasing the vacuum with carbon dioxide gas rather than with air aids markedly in maintaining the acidity or hydrogen-ion content of the egg white. Eggs treated in this way stand up better in storage than do the open-dipped eggs.

That the vacuum carbon dioxide method has merit is shown by comparisons under well-controlled conditions with unoiled eggs, and with eggs oiled by other methods. Experiments in which the eggs were treated and graded in the laboratory and stored in a commercial egg-storage room showed that during 11 months' storage the unoiled eggs lost 7.71 per cent of their weight, and the open-dipped eggs lost 1.6 per cent, whereas the vacuum carbon dioxide-dipped eggs lost only 0.1 per cent of their total weight. The fall in grade was equally striking. After 11 months' storage none of the unoiled eggs were in the two top grades (Specials and Extras), whereas 30.14 per cent of the open-dipped eggs and 46.7 per cent of the vacuum carbon dioxide-dipped eggs were classed in these grades.

The unoiled eggs showed an average pH of 8.99, the open-dipped eggs an average pH of 8.63, and the vacuum carbon dioxide-treated eggs an average pH of 8.2. The additional acidity in the carbon dioxide-treated eggs aids materially in maintaining egg quality.

Several hundred cases of high-grade eggs have been oiled by the vacuum carbon dioxide method and are being stored under commercial conditions. These studies should indicate whether the application of the new method to commercial practice is feasible.

LAWRENCE H. JAMES, and T. L. SWENSON,  
*Bureau of Chemistry and Soils.*

**E**RGOT Importations Are Tested for Quality and Purity by U. S. Officials

Rye is subject to a disease, caused by a parasitic fungus, ergot, which is disastrous to the rye itself, but which results in the production of a useful drug.

Farmers in this country make every effort to keep this disease out of their fields. Nevertheless, even in the United States, some ergotized

rye is found. The millers adopt means of sifting it out of the rye because the fungus is poisonous. These siftings might, perhaps, be utilized to furnish a supply of the drug, but apparently this has not been regarded as profitable here. In Europe, however, where ergot in rye is much more common than in this country, the drug is gathered in ton quantities. Farmers in Europe collect this material and sell it to drug dealers who dry it carefully to prevent its becoming moldy, then preserve it in warehouses where it can be kept dry and free from worm or insect infestation. These dealers, located principally in Spain, Portugal, Germany, Russia, and Poland, ship the drug all over the world.

If not properly kept, ergot readily deteriorates, becoming moldy and worm-infested. The Federal food and drugs act prohibits the importation into this country of the deteriorated drug. It is the duty of the Federal Food and Drug Administration to see that only the pure drug gains entrance at our ports. To accomplish this, all importations, before they are delivered to the American purchaser, are subjected to Federal examination. Not only is the drug required to be free from deterioration, as judged by its general appearance, but it is tested to determine whether it possesses the medicinal quality for which it will be used.

#### Uses of Ergot

Ergot has been used in this country for more than 100 years to prevent hemorrhage after childbirth. At the present time, other drugs, more quickly acting, are replacing ergot to a considerable extent. Even so, a considerable amount of the drug is still used and under some circumstances, there is no better medicinal agent. For a long time it was not known what particular constituent was responsible for the drug's effects. This lack of information sometimes led to the preparation of the drug in a way which we now know resulted in discarding the really important principle and retaining worthless constituents. Increased knowledge of the drug's character has enabled manufacturers to prepare for physicians a potent, uniform, and reliable preparation. The Food and Drug Administration continuously surveys crude ergot on the American market, as well as preparations made from it, upon which the physician depends in his practice.

Efforts have been made to determine the potency of the drug by chemical means. While some encouraging results have been obtained, the only methods generally accepted as giving certain and accurate estimates are what are known as biological-assay tests. The law requires these processes to involve actual experiments upon animals. Loss of human life might result if the drug were not up to legal standard. The only test which is legal under the Federal food and drugs act requires the use of roosters. Briefly described, this test consists in observing the effect on the rooster's comb when the liquid ergot preparation is injected by means of a hypodermic syringe. If the drug is potent, as it ought to be, it will constrict the blood vessels in the comb, preventing the free circulation of blood, thereby changing the normal, healthy, red color of the comb to a dull purplish tint. If the drug fails to produce this effect, it is not potent and, if administered to a patient, would not be as effective as the doctor has a right to expect.

If the drug does not meet legal standards, the Department of Agriculture refuses to permit its entry into this country. If the article

tested is an ergot preparation being distributed in inter-state commerce in the United States, and if it falls below the required standard, the consignment is seized and destroyed or otherwise disposed of in such a way that it will not be used for medicine.

W. T. McClosky, *Food and Drug Administration.*

**E**ROSION Control Proves Successful on Ranges in Southeast Oregon Forest officers and stockmen on the Fremont National Forest in southeastern Oregon are making notable progress in the control of erosion. They are

also carrying on practical everyday research in determining the types of dams best suited to the different soil, slopes, and weather conditions of the region.

The Fremont Forest is a high plateau containing almost a million acres. Throughout this area are many mountain meadows and upland grass and sage prairies which furnish much forage for sheep and cattle. On these areas gully erosion threatens to become a menace, and the control work is being done here.

Erosion found on the Fremont Forest is caused by a combination of factors but is principally due to three causes:

(1) Disappearance of beaver and beaver dams which at one time assisted greatly in storing water and preventing gully washing during flood periods.

(2) An extended period of drought which greatly reduced the growth of soil-binding vegetation.

(3) Rodent infestation, honeycombing and aerating the soil.

Keeping the soil continuously covered with a complete stand of vegetation is the only certain method of preventing erosion, and this is the objective toward which local forest officers are working.

Legislative action for the protection of beaver has been obtained, and the Bureau of Biological Survey, the Forest Service, and stockmen are cooperating to exterminate ground squirrels. Simple, practical, range-management plans, providing for deferred and rotation,



FIGURE 45—A simple dam of brush is very effective in removing much of the soil from the water as it filters through the dam



FIGURE 46.—Where they are available, rocks make very suitable material for dams

grazing, have been developed for improving both the quality and the quantity of vegetation.

Erosion damage is being repaired and further erosion prevented by dams designed (1) to check the force of flow and cutting power of the water and (2) to fill up the gullies. (Fig. 45.) Dams of rock, brush, and combinations of these materials have been employed and have been made to serve the double purpose of preventing the undermining and cutting action of the water and at the same time of building up a dirt fill. (Fig. 46.)

Already the work is bearing fruit. In the

larger gullies—10 to 15 feet wide and 10 feet deep—where several dams have been built in series, each succeeding run-off brings down its load of silt and drift debris and deposits it behind the structures to build up fills so that in many cases the original level of the land is being

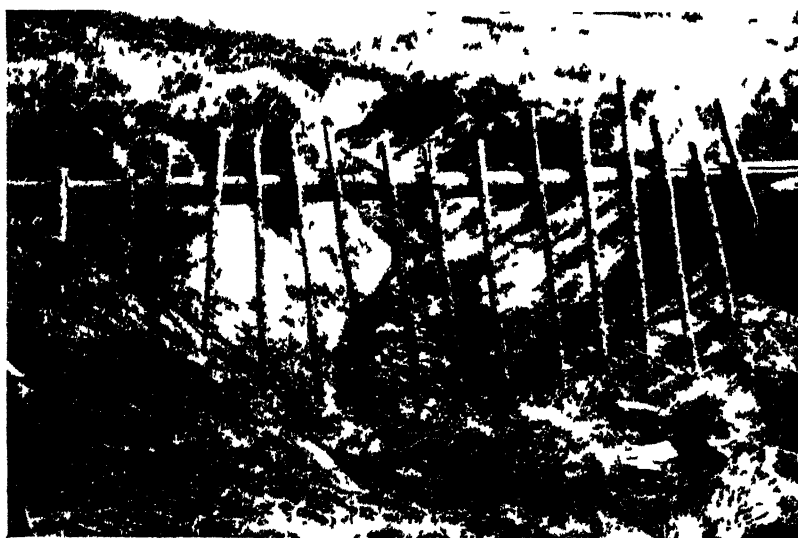


FIGURE 47.—Woven wire placed across gullies collects drift and soil and reduces the force of flow

rapidly restored. Smaller structures placed near the heads of channels are very effectively checking further erosion.

To be successful (fig 47), erosion control must stop gullying while the gullies are small, and it is by doing this that the work on the Fremont Forest has been so effective. Moreover, the work has been done without appropriation and expenditure of large sums of money, much of it being incidental to the regular duties of local rangers.

W. L. DUTTON, *Forest Service*.

## EXTENSION Records Show That Improved Practices Pay in Poultry Profits

The poultry industry has always been beset with schemes that look well on paper but fail when put into practical operation. The extension poultry specialists and county agents, who come in daily contact with the farmers and commercial poultrymen, do not take up with alluring get-rich-quick ventures. They have found it more practical to recommend and advocate improved practices that are backed up by scientific information and that have a demonstrated value. In many instances such practices have proved successful, not only with individual cases but with large numbers of cooperators. An excellent illustration is the "Grow Healthy Chicks" program now being carried out in more than 40 States. This plan emphasizes fundamental flock-management points in raising the pullets. These practices include the use of vigorous, disease-free breeding stock; clean, sanitary ranges; and clean and efficient feeding. In Missouri the yearly records of over 100 farms were collected and analyzed to check up the results of this "Grow Healthy Chicks" campaign. It was found that the farmers following the Missouri plan obtained 166 eggs per bird, while those following ordinary methods were able to gather only 139 eggs per bird—a difference of 27 eggs. This increased production was highly profitable, for it was found that where the improved practice was followed, the return from the average hen in the flock, above the cost of feeding, was 74 cents more than the return from the average hen in flocks in which ordinary raising methods were followed.

### Control of Disease of Turkeys

In recent years science has contributed much toward the control of that dreaded disease in turkeys known as blackhead. New methods of combating this disease have been evolved, and a turkey-management system has been perfected, so that blackhead is not the menace it once was in the turkey industry. The blackhead disease drove Turkey production from the New England States to the Middle West, and from there to the great open spaces of the West and Southwest. The Oregon Extension Service has been active in promoting better methods of turkey management in rearing, feeding, and dressing. An excellent illustration of the results of improved practices which brought increased profits was furnished by a flock which matured 408 turkeys from 29 breeding hens. These birds, when dressed for market, graded 99.7 per cent prime and choice, while the average producer in the Oregon turkey pool had only 87.6 per cent prime and choice birds. Twelve per cent more top-grade turkeys, with a higher price of 5 or 6 cents per pound, amounts to a very material increase in returns.

An excellent example of the practicability of a disease-prevention program comes from Connecticut. Here many flocks were visited each fall by an outbreak of fowl pox, more commonly called chicken-pox. Though this disease is seldom fatal, yet the decrease in production and the loss in efficiency of the hen are factors in the annual income.

A quick and inexpensive method of immunizing the pullets was developed, and arrangements were made for a laboratory to prepare and distribute a vaccine. The method perfected consisted in taking growing pullets about 10 weeks old, plucking four or five feathers from the leg of each, and painting the spot with the liquid vaccine. In one year over 80,000 birds were vaccinated, and records of the egg production from these flocks were compared with those from flocks composed of 30,000 birds which were not vaccinated. This comparison showed an average difference of  $5\frac{1}{2}$  eggs per bird, in favor of the vaccinated birds.

#### Results of Flock Management Program

Whenever a recommendation covers a variety of points it is always more difficult to show definite results than from a single practice. In Illinois a complete sanitary flock-management program for the laying flock has been developed. This includes: (1) Confining the birds to a double-yarding system, allowing them outside runs on sunny winter days; (2) applying certain biological tests to mature birds; (3) equipping poultry houses with proper ventilation and sanitation devices and thoroughly cleaning and disinfecting them regularly; (4) raising all young chicks on clean range away from the old stock. This long list of improved practices limits the number of persons who can qualify, yet 50 owners who carried out all the points, were found. The records of their flocks, when compared with the records of flocks on 196 farms on which the specifications could not be complied with, showed a marked improvement. Flocks on the farms on which the sanitation program was carried out produced 27 more eggs per bird, and a labor income of 61 cents more per bird, than did the flocks on the farms where the measures were not carried out.

One interesting point in these records is that the total investment per hen in the sanitation flocks was only \$4.14, whereas in the non-sanitation flocks the investment was \$4.69. In other words, these flocks were practical farm flocks, not millionaires' playthings. The selling price per dozen eggs was 1 cent more on the sanitation farms, and the feed cost per dozen eggs was 3 cents less. This low investment, coupled with a better average selling price and low feed cost, explains the difference of 61 cents labor income per bird.

It is by such records that the poultry extension specialists and county agents show the flockowner that the practices advocated are practical and bring about increased profits.

H. L. SHRADER. *Extension Service.*

#### EXTENSION Services Emphasize Milk Quality in Cooperative Program

Milk, pleasing to the taste, clean, safe, and with good keeping qualities, produced under sanitary conditions, is what the consuming public desires. Such milk stimulates consumption and, therefore, benefits the dairyman producing it. The same principles hold true for the products made from milk, such as butter, cheese, and ice cream.

A number of State dairy specialists have incorporated in their programs methods for instructing dairymen in the few simple and easily applied steps in producing a high-quality product. Every year the dairymen of this country are handicapped by having to take a preventable loss running into millions of dollars, because of off-flavor sour milk, or milk of high bacterial count. The reduction of this loss to the dairymen and the creation of a greater satisfaction on the part of the consuming public, with the resulting increase in consumption of milk, is the goal of extension effort.

The methods of attack on the problem of low-quality milk are varied. They can be grouped, however, into three general divisions: (1) Educational work with adults, (2) 4-H milk-quality-improvement clubs, and (3) area-improvement plans.

The educational work with adults is now being carried on in a number of States. A plan for a project, describing the manner in which such work can be conducted, is available in mimeographed form. The plans contemplate the use of a wide variety of extension methods and includes surveys, publicity, meetings, circular letters, exhibits, and motion pictures. The Federal extension forces cooperate with the State departments of agriculture and public health, and with local health authorities, milk producers' associations, milk dealers, and the leading dairymen.

#### 4-H Clubs Cooperate

The 4-H milk-quality-improvement clubs are organized for the purpose of training boys and girls in methods of producing a high grade of milk. These boys and girls will be the leading dairymen, dairywomen, and dairy leaders of their generation. Upon the foundation laid now will largely depend a continuance of progress in improving the quality of milk. The suggested project work for such clubs has been prepared as a series of tests and comparisons on milk samples which are to be studied by the members and handled in certain ways in order to bring out the benefits of certain production methods.

The area plan closely links up educational work with adults and regulatory work in a given area, and offers to smaller towns and communities the same satisfactory supervision of milk supplies that is enjoyed by large cities. The educational work on production of high-quality milk is conducted with the dairymen in the same manner as in the adult work above outlined. The field of operations, however, is a definite area, such as a county or a number of towns and communities within a limited radius. In addition to the educational program with the producers, sentiment is developed with consumers, dealers, and town and county officials, in cooperation with the representatives of the State departments of agriculture and public health for a safe supervision of milk supplies. The establishment of a well-equipped laboratory with a trained worker and a field inspector in each area is made possible by the cooperation of the various towns and communities within the area, these units financing the laboratory with contributions in proportion to their populations.

The three phases of this work have been developed for one purpose—improving the quality of milk. Improvement of milk quality is essentially an agricultural problem and responsibility. Extension agencies should supply the leadership. In no way need this program interfere with the regulatory work of the constituted authorities; rather it supplements that work. Such a program lays the groundwork for

better-quality milk, creates sentiment on the part of the producer, consumer, and dealer for better-quality milk and forms an important part of the plan of dairy extension work in every State.

JOSEPH B. PARKER, *Extension Service*.

## EXTENSION Work in Hawaii Has Many Problems Not Found on the Mainland

Cooperative extension work was established in the Territory of Hawaii November 1, 1928. The Smith-Lever Act, May 8, 1914, establishing cooperative extension work between the United States Department of Agriculture and the land-grant colleges in the several States, had not included the Territories in its provisions. Boys' and girls' clubs, somewhat similar to those of the mainland, also were established by the Federal experiment station. The University of Hawaii for many years previous to 1928 had been receiving small appropriations from the Territorial Legislature for extension work.

The Territory of Hawaii is made up of an archipelago in mid-Pacific and lies wholly within the Tropics. Climatically it is subtropical rather than tropical. Rainfall in different localities is exceedingly variable, depending upon the altitude and on whether the land exposure is to windward or leeward. The annual rainfall varies from 0 to over 400 inches. The soil is of volcanic origin and is fairly fertile. Large quantities of chemical fertilizer are used in crop production. There are five major islands extending 400 miles from northwest to southeast; Kauai, Oahu, Molokai, Maui, and Hawaii. Other smaller islands of some importance are Niihau, Kahoolawe, and Lanai. The total land area is 6,407 square miles, or about that of Connecticut and Rhode Island combined. There are 310,000 acres in cultivation. While Hawaii is primarily agricultural, there are few farmers in the mainland sense. Hawaii's agriculture is under the control of a few large corporations and a number of somewhat smaller companies. The 1930 Federal census shows 4,794 farmers. Sixty-two per cent of the value of the agricultural output of the islands is in sugarcane and 30 per cent in pineapple products. These are produced on great plantations operated by corporations with indentured labor, at present mostly Filipinos and Japanese. The beef-cattle industry, which ranks third, amounts to only 2 per cent, coffee to 1.31 per cent, dairying to 1.12 per cent, poultry to 1 per cent, and rice to 0.534 per cent.

### Population is of Many Races

The island population (568,336) is quite cosmopolitan, orientals predominating. The most important elements other than the native Hawaiian are Chinese, Japanese, Koreans, Filipinos, Portuguese, and Scotch, and a few other Europeans, and Americans from the States. The schools are excellent. English is spoken by all of the younger generation and is the language of business and society. The title to the land is held mostly by a few large estates, and most of the large plantations as well as the small farmers operate under leasehold. Camps for the families of plantation laborers consist of small frame cottages, each usually equipped with running water, electric lights, a sewage disposal system, a bath, and laundry facilities. The agricultural products other than sugar and pineapples consist of rice, coffee,

poultry, dairy and livestock products, bananas, papayas, avocados, citrus fruits, and vegetables. This small production is carried on by Chinese, Japanese, Portuguese, and a few Hawaiian farmers. The agricultural extension service is organized as one of the units of the University of Hawaii. There are two assistant directors, one for agriculture and one for home economics, each being in charge of all extension work in his respective field. There are 10 county extension agents, 5 each in agriculture and home economics. There are territorial agents in animal husbandry, forestry, marketing, and sugar technology. The extension staff is well trained, its members being graduates of the University of Hawaii or of mainland colleges. Four employees have had extension experience in the States. Entire salaries and all expenses of the staff, including the county extension agents, are paid by the University of Hawaii and the United States Department of Agriculture. The home-economics extension work is done through home-demonstration clubs, and the agricultural work through individuals or community and commodity groups. The boys and girls' 4-H extension clubs are identical with the organizations on the mainland.

### Character of the Extension Work

Extension work in the Territory is quite different from the work in the States. The two leading crops, sugar and pineapples, each support great research organizations of their own. The sugar-planters' experiment station has an annual budget of \$525,000, and the experiment station supported by the Hawaiian pineapple canners has an annual budget of \$350,000. Under the system of corporation farming with indentured labor, it is possible for the corporations to put into immediate practice the results of research. The effectiveness of this system is manifest by the enormous yields and the high-quality product. As much as 18 tons of raw sugar and 20 to 30 tons of high-class pineapples are produced per acre. The fringe of farming outside of pineapples and sugarcane is carried on for the most part on land operated under leasehold. The principal agricultural enterprises open for extension work are coffee, bananas, rice, fruit, swine production, home gardening, poultry, and dairying. There are a few range-livestock outfits operated on a very extensive scale, such as the Parker ranch which has 30,000 purebred and high-grade Herefords. This ranch probably has the largest purebred herd of Herefords in the world.

The opportunities for community groups in cooperative organizations are handicapped by the great mixture of races and people unable to understand each other. This is gradually being changed as the present generation of young people comes into adulthood. (Fig. 48.) Even under existing conditions, however, the extension service has made a remarkable showing.

### Rat-Control Campaign

In the Kona region of the island of Hawaii, rats have been a serious pest on coffee farms, most of which are operated by Japanese. It is estimated that in that region rats take an annual toll of at least \$100,000. Before the beginning of the extension work this had been accepted as something impossible to be controlled. The county extension agent in 1929 organized a rat-killing campaign through the

boys and girls' clubs and the campaign accounted for 3,000 rats in a very brief period. This was repeated in 1930 and more than 10,000 rats were disposed of. The estimated saving in a year as a result of this campaign amounted to \$50,000.

On the island of Kauai the county extension agent cooperated with the rice growers. This industry, which was once of considerable importance in the Territory, has been rapidly disappearing due to a number of causes, among others devastation by the rice borer. Control methods have been developed through parasites brought in from the Orient. The county agent procured and released these larval parasites and also instructed growers in the use of light traps.

While Hawaii has some well-managed range pasture lands, there are evidences of overgrazing and the disappearance of native grasses. The

county agents have cooperated with the large ranches in conducting cooperative pasture tests.

The islands bring in from the States a large part of the poultry products consumed. There are a few commercial poultry plants but most of the poultry is raised in comparatively small lots. The county agents have assisted poultry raisers in culling, housing, economic feeding, and management. Particularly have they helped them in controlling sorehead,



FIGURE 48.—A girls' 4-H club, meeting with the home-demonstration agent, Kalapana, Hawaii

a terrible disease in the Tropics. Mosquitoes are carriers of this disease. Above-ground, mosquito-proof houses are constructed to house the chicks until they are well grown.

Most of all, small farmers need organized marketing. The market situation in the city of Honolulu is deplorable. There is no standardization of varieties, and no attempt has been made to control surplus. As a consequence there are frequent periods of glut and of scarcity. Most of the vegetables are grown by orientals and are the varieties with which they are familiar. The flavor of these vegetables is not relished at first by those not accustomed to them. The extension service is gradually introducing better commercial varieties.

### Home-Demonstration Work

Extension work with women also presents unusual difficulties. Very rarely do the rural women speak English. They are isolated. There is little community or social life. They want their children to be American, to eat American food, and to dress in American fashion, and they are proud of their advancement in American ways. It requires much patience to teach these women, but they amply repay it with

affection, earnestness, and faithfulness once their interest is aroused. Imagine the lost feeling an extension agent must have in meeting with a group of 10 or more women when 4 or 5 different languages are spoken, not more than 2 of the group being able to speak to each other, and perhaps no one able to speak to the demonstrator. Such situations must be met. The demonstrations must be simple and tell their own story. The lessons frequently must be translated into 3 Filipino dialects—Visayan, Tagalog, and Ilocano—each as distinct from the other as French from English; and perhaps also into Portuguese, Chinese, Japanese, or Korean. Some of the homes are well furnished (American way) but in most of them there is pathetically little. The home-demonstration agents have shown the women how to make ovens out of 5-gallon oil cans, how to make iceless refrigerators and window coolers. Often the families do not like American vegetables and can not get the oriental varieties. As a result, far too few vegetables are eaten under conditions where they could be produced abundantly. The same is true of fruits. Too little milk is used. Orientals are not accustomed to it and have to learn to like it. Malnutrition and some nutritive diseases exist. Teeth are bad almost universally and sore eyes are a common malady. Much health work has been done by plantation nurses and doctors, but the extension service has been the first to go into the homes and show the women how to cook with their crude equipment so that they will like the vegetables. Racial likes and dislikes have to be understood and observed if progress is to be made. Leaders are being found and are developing enthusiasm and skill in demonstration. The older women adhere to the conventional dress of their native lands but the daughters “go American” and are as proud of pretty clothes as debutantes and want them “made right.” Clothing work is popular and many of the girls become deft seamstresses. At the outset much of the extension work with women was necessarily individual, but in the past year home-demonstration clubs have been organized. Women’s vacation camps have been held during each of the past two years and are becoming increasingly popular. The women take kindly to games and folk dances and nothing so quickly breaks down racial aloofness and bashfulness as playing together.

### Boys and Girls’ Club Work

Boys and girls’ 4-H extension clubs are popular. The children of all races like these clubs and here there is no language difficulty, as the young people speak English. It is an inspiring sight to witness the enthusiasm of these clubs, made up as some of them are, of native Hawaiians, Chinese, Japanese, and Portuguese, all repeating the club pledge in unison and giving the salute to the flag like the real Americans that they are. There are club camps and picnics on each of the islands and the clubs hold their regular monthly meetings, the children being very punctilious about their parliamentary practice. For the last two years there has been a big Territorial 4-H boys and girls’ club camp at the University of Hawaii. During the year 1931 the various clubs earned sufficient money to pay the expenses of their own delegates to the Territorial camp. The clubs are of much the same kind as on the mainland, though there are a few that are peculiar to the islands, such as coffee, taro, frog, and banana clubs. The frog club has become quite popular, as it is a source of ready money. The chief

drawback to boys and girls' 4-H extension clubs is that the children are employed in the canning factories and the fields during school vacations; also, among the Japanese, who compose the largest racial group, the children do double school duty. After the public schools are dismissed, Japanese children then go for a similar period to Japanese language schools. In spite of this, however, the children of this race make up a considerable part of the club enrollment, due to their ambition for education and advancement. In 1929 an island-born Japanese boy represented Hawaii at the National 4-H Club Camp in Washington, D. C. He was accompanied on his trip by a Chinese county agent. In 1930 there were 1,664 boys and girls enrolled in clubs.

WILLIAM A. LLOYD, *Extension Service.*

**F**ARM Buildings Should Be Repainted Before Wood Weathering Begins A good paint job is the best insurance against the necessity of early repainting. Use of inferior paint is poor economy. It is hard to distinguish between good cheap paints and poor ones, and the cheap paint must be applied more skilfully if it is to give the best service. Paints of dark color are cheaper and more durable than white or light-colored paints of equal quality.

Good workmanship is even more essential than good paint. Stingy application saves paint at the expense of durability and appearance; uneven application is fatal to both.

The first important change in a new paint coating is the collection of dirt. Discoloration is most conspicuous on white and light-colored surfaces and least noticeable on dark colors and grays. If pride in the appearance of his dwelling decides the owner to repaint it at this stage, one coat of paint every two or three years will be enough.

If the coating does not become dirty enough to call for repainting, there may be a fading of the color, noticeable first on that part of the house or barn most exposed to sunlight. The coating is no longer glossy, and when the finger is rubbed over it, a chalklike powder comes off. Fading is most pronounced in paints of light colors containing large amounts of white pigment, with a smaller amount of coloring pigment.

Even after paint has faded considerably, repainting is not yet necessary except where looks are the first consideration. But it is time to watch closely, because more serious changes may soon set in.

Perhaps the next change is a flaking or tearing loose of small pieces of the coating, leaving the wood beneath bare. It is now high time to repaint. Do not wait for the flaking to leave great areas of wood bare. It is hard to paint such a surface satisfactorily, and there is risk that the new coating will soon fail. (Fig. 49.)

#### An Early Sign of Aging

In many paints an early sign of aging is the formation of tiny interlacing cracks in the coating. If on looking very closely you can see the wood beneath the cracks, or small yellow spots of iron rust over the nail fastenings, the coating no longer keeps the moisture out effectively, and the time has come to repaint.

In wood weathering, the most serious form of damage to a paint job, larger cracks become visible, running parallel to the grain of the wood. An occasional board is found to be cupping outward, leaving a gap between it and the board below, or pulling loose slightly at the joint with the corner board. In a badly neglected or abandoned house the boards become roughened, curled, and cracked like dead leaves, and no painter could put a decent coat of paint on them.

Flaking coatings can be restored by repainting, but wood that is roughened and twisted by weathering can not be repaired so easily, and it is dangerous to postpone repainting, after the appearance of signs indicating that the coating no longer protects the wood adequately.

Repainting the barn will usually be postponed a year or two after repainting the house, but it should not be deferred until the structure is flying distress signals.

F. L. BROWNE, *Forest Products Laboratory.*

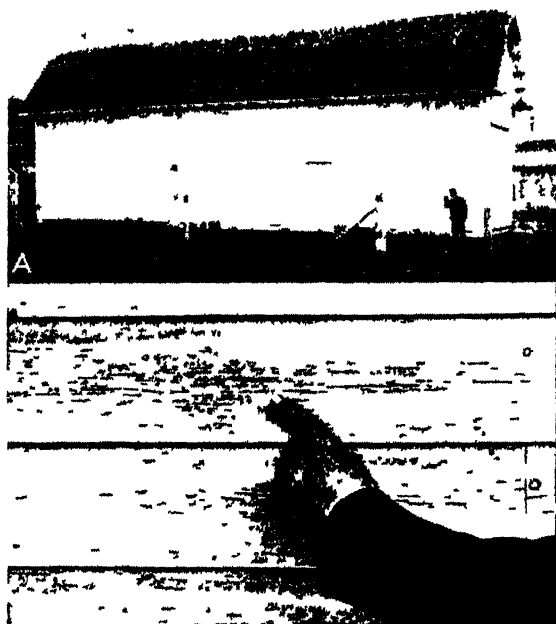


FIGURE 40.—Many a building appearing to be well painted, as the barn in A, on closer inspection will be found to have a paint coating that no longer gives protection, as is illustrated by the close-up B, of the same barn.

## FARMERS' Account Books, Diaries, Etc., Are Often Valuable Research Aids

The importance of preserving farmers' account books, diaries, letters, and reminiscences for the use of research workers is being realized increasingly. Of similar significance are country-store account books, mill records, old farm periodicals and rural newspapers, pamphlets, reports and programs of agricultural societies, and pictures of all phases of rural life. These commonplace documents of the past are the necessary sources of the information used by historians and economists in making analyses of our past agricultural and economic life.

These materials supply research workers with many facts not obtainable elsewhere. They furnish data indicating the course of farmers' standards of living; they show the influence of the competition of various agricultural sections, the changing conditions and wages of farm labor, the ups and downs of various systems of farm management, and the trends of crop acreages. They afford figures on the cost of ferti-

lizers, machinery, twine, and other supplies and information on yields, disease epidemics, the dates of the introduction of new varieties and breeds, and new cultural practices. The country-store records throw light on the spread between rural and city prices and the changing margin between the cost and selling prices. Notable examples of what can be done with this type of price data are Arthur G. Peterson's *Historical Study of Prices Received by Producers of Farm Products in Virginia, 1801-1927*, issued as Virginia Agricultural Experiment Station Technical Bulletin 37, and the Maryland Agricultural Experiment Station Bulletin 321 by Roger F. Hale on *Prices Paid for Maryland Farm Products, 1851-1927*. Pamphlets and reports of agricultural societies are indispensable if we are to have accurate accounts of the part these organizations took in political movements, the contributions they made to the social side of rural life, and their attempts at cooperation.

The analyses by agricultural economists and historians offered to us in the form of articles, books, and bulletins have been listed in a *Bibliography of the History of the Agriculture of the United States*, issued by the United States Department of Agriculture as Miscellaneous Publication 84. These various studies show us how the present agricultural and economic conditions came about; they emphasize our agriculture as a result of development. They afford perspective, that is, a realization of what are the more permanent and what the more accidental and transient elements of present-day conditions. Reading them broadens our sympathies, steadies our judgments, and enlarges our experiences.

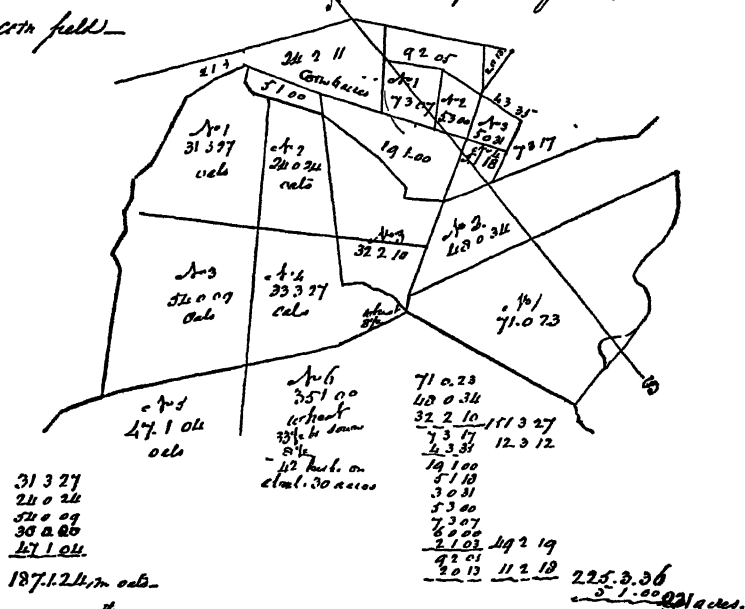
### Preservation and Use of Materials

Various organizations have taken, and are taking, steps to preserve these materials from which the history of American agriculture may be written. Nearly all of the State historical societies and commissions have done something, and a few of them have done notable work in this direction. The Department of Agriculture, through its library and the division of statistical and historical research of its Bureau of Agricultural Economics, is cooperating with the Agricultural History Society in developing an agricultural-history collection as the national center of research in this subject. Gifts and information concerning the location of materials for this collection are welcomed. The Business Historical Society with headquarters in the George F. Baker Library, Soldiers Field, Boston, is actively collecting and promoting the preservation of business records, including farm records. The McCormick Historical Association in Chicago has gathered several hundred thousand items. The University of Virginia and the College of William and Mary are assembling materials pertaining to Virginia. At the University of North Carolina, J. G. de Roulhac Hamilton is directing the development of a national southern collection. The University of South Carolina has interested itself in the records of old plantations, and E. Merton Coulter of the University of Georgia has a notable collection of about 5,000 similar documents. The agricultural colleges of Cornell University and the University of Wisconsin are utilizing many old farm, mill, and creamery records in long-time price studies. The State Historical Society of Wisconsin and the Minnesota Historical Society have a considerable number of farmers' diaries and similar documents. In the South-

west, T. C. Richardson, field editor of Farm and Ranch, is head of a committee of the Texas Agricultural Workers' Association which is gathering and indexing material bearing on the agricultural, social, and economic development of Texas. (Fig. 50)

1837

we had some hard chances to-day the following is a diagram of the several corn fields—



11<sup>th</sup> of June Tuesday—there was a severe frost last night, but to-day had been mild. There is a prospect of good weather. The peach trees are in full bloom. 2 ploughs began plowing the hill sides after midday yesterday. 3 are ploughing in the ponds, where we cultivated in corn last year—a very large portion of the (mud) seems to be not touched by the cold weather of the 6<sup>th</sup>.

12<sup>th</sup> began to plant corn to-day on the hill sides. Therm 70° to-day yesterday. Wind beats against it—

13<sup>th</sup> Tuesday—there was much frost last night—the weather for several days—

FIGURE 50.—Page from the agricultural journal of B. T. Tayloe of King George County, Va., in the possession of the library of the United States Department of Agriculture

### Most Useful in Historical Collections

Having indicated the utility of these materials as sources of information on our agricultural life, it is hardly necessary to plead that they be given to historical collections. To preserve them is to show grati-

tude—an appreciation of the generation whose labors are therein recorded. It is also doing a great service to research workers, for they can use them to significant advantage. While the materials may possess a certain value to their owners, their perpetuity should not be menaced by failure to take steps to preserve them from destruction by fire and other disasters. It is hoped that readers of this article who have or know of materials of the kind here discussed will aid historical and economic research by giving them to historical collections or depositing them with such collections. There they will be classified, filed in fireproof cases, and made forever accessible to research workers.

EVERETT E. EDWARDS, *Bureau of Agricultural Economics.*

## FARM Prices and Incomes Reflect Business and Financial Conditions

The general depression of 1930 and 1931 is one of many that have almost periodically marred the industrial and agricultural progress of the United States. Most farmers remember the previous major depression of 1920-21 when prices of farm products fell drastically and left many

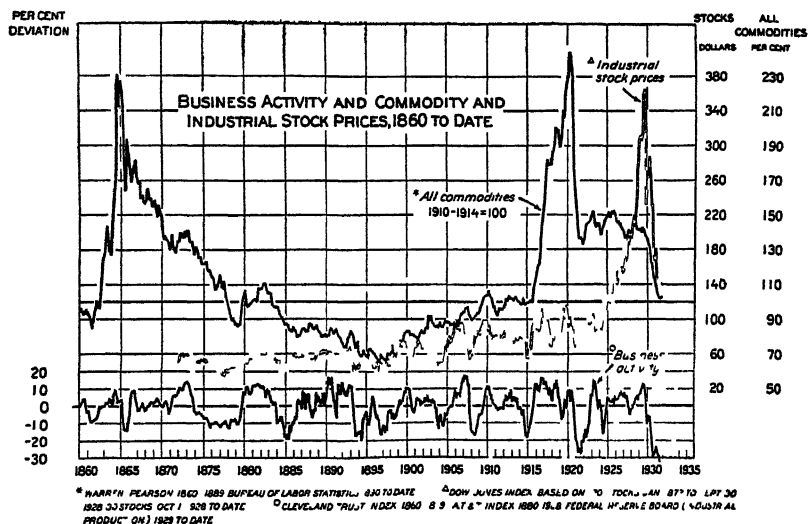


FIGURE 51.—The business depression of 1930-31 is one of many that have marked the industrial and agricultural progress of the United States. Like those of the 1870's, 1890's and 1920-21, it is characterized by a drastic decline in commodity prices, both agricultural and nonagricultural.

with debts incurred during the hopeful prosperous years of 1918-19. Others may remember the business depression after 1893 when prices fell to abnormally low levels, leaving farmers stranded with high debts and expenditures. And a few may recall the protracted decline in prices during the long depression after 1873. Many other depressions (fig. 51) have intervened between these major ones but these three were more nearly like the present one in that the greatest damage done to agriculture came as the result of great reductions in farm prices and in farm incomes.

Between June, 1920, and June, 1921, the level of all farm prices in the United States was reduced by more than one-half (from 234 per cent of pre-war prices to 110 per cent). Between October, 1929, and October, 1931, they were again reduced by more than one-half (from 140 per cent of pre-war prices to 68 per cent). In this depression as in the others the falling prices made farm mortgages, other debts, farm taxes, and even current operating expenses additionally burdensome.

The effect of the business depression is readily seen in the gross income from the total agricultural production of the three seasons 1929, 1930, and 1931. For the production of 1929, when the country was generally considered to be in a state of prosperity, with very little unemployment and nearly everybody happy and hopeful, farmers received a gross income of \$11,900,000,000. In 1930, the total farm production was about 2 per cent less than in 1929, but prices, instead of being higher as they normally are for smaller production, fell sharply as the 1930 depression developed here and abroad. The result was that farmers received only \$9,300,000,000 for a smaller volume. In 1931, the total production was somewhat larger than that of 1930, but prices, still affected by the business depression, continued to still lower levels greatly out of proportion to the larger output of such cash crops as cotton, corn, and potatoes. Consequently gross farm income was further reduced from \$9,300,000,000 in 1930 to \$6,900,000,000 in 1931. The reduction in two years amounted to more than 40 per cent.

#### Certain Expenses Lower

Part of this decline in gross income in 1930 was offset by somewhat lower prices of farm supplies and farm labor, but farm taxes and interest on farm debts remained practically unchanged. The effect was an abnormally low net income barely sufficient to reward the average farmer for the physical labor he and his family put into the 1930 production. He received practically nothing for his capital or for managing the farm. During 1931, prices of goods bought by farmers fell still more. Farm wages also declined again as more city people joined the ranks of the jobless, some of them seeking jobs on farms. But taxes and interest remained practically at their previous high levels. Consequently the 1931 returns from agricultural production were insufficient to give the average farmer either an adequate reward for his labor or for his capital. In this respect the 1931 business depression treated farmers even worse than did the 1921 depression.

#### Specific Results of the Depression

What are some of the specific ways in which the 1930-31 business depression here and in other countries registered itself in lower farm prices and in lower net farm incomes? In the case of cotton the reduction in industrial activity which set in after June, 1929, was accompanied by a reduction in the domestic mill consumption of cotton. (Fig. 52.) This reduced industrial demand, together with similar developments abroad, brought about an accumulation of unused cotton, and a drastic drop in the price of raw cotton from 17.9 cents per pound in June, 1929, to 7.7 cents in June, 1931. By this time much of the cotton goods in retail stores had been consumed,

and prices had fallen so low that mill consumption of cotton here and in other textile centers increased. For similar reasons cotton consumption expanded during 1921 while business in general was still depressed. The favorable growing season of 1931, however, improved crop prospects and more than offset a 10 per cent reduction in cotton acreage. By October 15 the farm price of cotton had fallen to 5.3 cents per pound, the lowest in over 30 years.

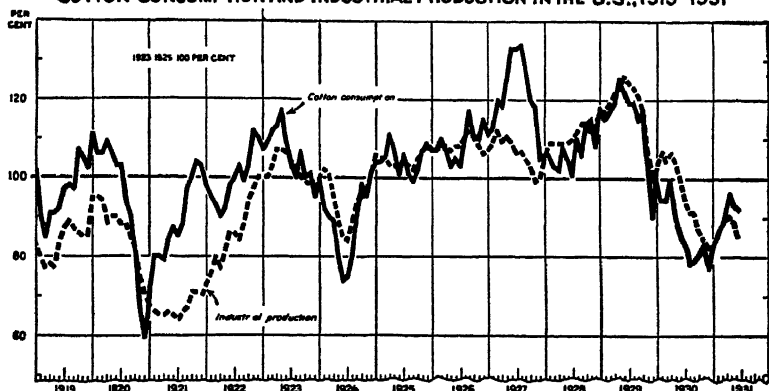
The consumption of tobacco was also materially affected by the decline in industrial activity. For example, in recent years it has been usual for cigarette consumption to increase anywhere from 3,000,000,000 to 13,000,000,000 cigarettes per year depending on the condition of business in general. (Fig. 52.) But in 1930, for the first time in many years, there was practically no increase and in 1931, as business conditions became still more depressed, cigarette consumption actually fell below that of 1930 by about 4,000,000,000. This failure to make the usual expansion in cigarette consumption in 1930, and the actual decrease in 1931, together with reduced demand in other uses of tobacco, were of course reflected in lower prices of tobacco received by the grower.

For somewhat similar reasons producers of food products received lower prices in 1930 and 1931 than in 1929. Among the food commodities we find some instances where the effect of the depression was to curtail consumption. In others, prices fell because consumers, though purchasing the same quantities, were unable to pay as much as formerly. In the case of butter, the reduced purchasing power of consumers in the fall of 1929 brought about an accumulation of storage holdings which helped to bring about very low prices in the winter of 1929-30. (Fig. 52.) Meat animals serve as a good illustration of commodities the prices of which fall because consumers, while continuing to take about the same quantities, are unable to pay as much as formerly because of reduced incomes. During the past 11 years there has therefore been a fairly close relation between food prices in the United States and business conditions as reflected in factory pay rolls. (Fig. 52.)

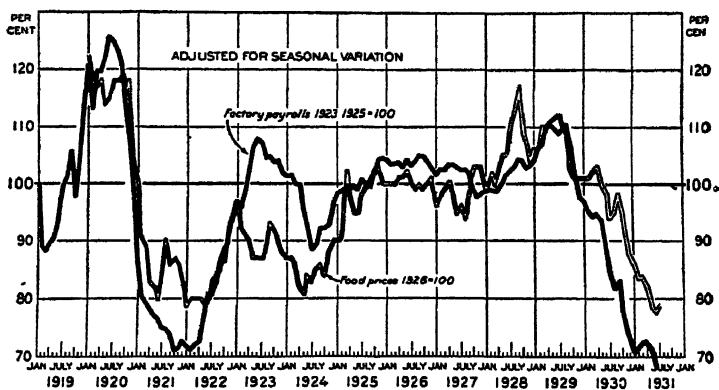
### Price Changes and the Business Situation

The prices of foods which are largely sold in the domestic markets and the purchasing power of domestic consumers as indicated by factory pay rolls, both experienced the boom of 1920, the great depression of 1921, the recovery of 1923, and the two cyclical fluctuations between 1924 and 1930. In 1923 food prices failed to rise as much as the recovery in the business situation warranted, but this failure was the result of burdensome supplies of food products. Another difference occurred in 1927 when factory pay rolls reached their low point a few months after food prices did. The greater general rise in these food prices since 1924 than that shown by factory pay rolls is due to the marked advances in beef prices due to a shortage of cattle, the peak of the beef-price cycle occurring in the last part of 1928. In spite of these differences, however, there has been a very definite reflection of the ups and downs in business and of the accompanying fluctuations in the wholesale prices of foods in the United States. Evidently wholesale dealers pay farmers more or less depending on the state of business.

## COTTON CONSUMPTION AND INDUSTRIAL PRODUCTION IN THE U.S., 1919-1931



## INDEXES OF WHOLESALE FOOD PRICES AND PAY ROLLS



## YEARLY INCREASES IN THE U.S. CONSUMPTION OF CIGARETTES AND INDUSTRIAL ACTIVITY, 1921-1930

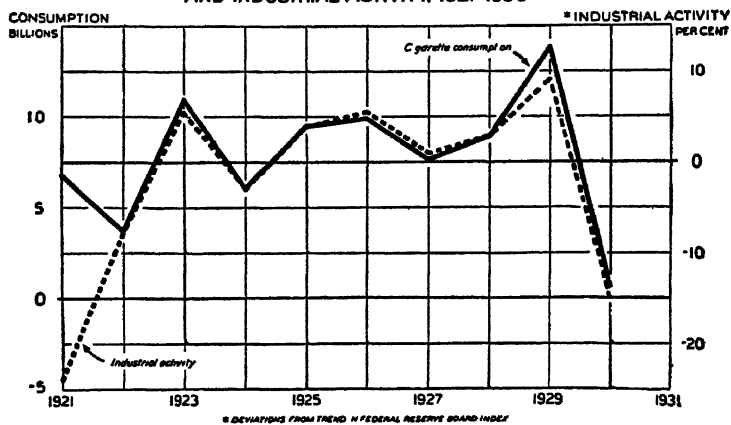


FIGURE 52 — There is a striking resemblance between certain indexes of industrial consumption on the one hand, and price or consumption indexes for certain agricultural products on the other

The ability of dealers in the wholesale markets to pay more or less depends, of course, on what they in turn are able to sell their wares for in the retail markets. This does not, however, mean that there is an exact correspondence between variations in wholesale and retail prices. Sometimes several weeks or months may elapse before prices on the retail markets are advanced or lowered in response to business conditions which have already affected wholesale prices. This was true in the fall of 1930 when butter prices to consumers were reduced some time after the reductions in the wholesale price, and a similar lag of retail prices after wholesale prices appears to exist in the case of meats. This failure of retail prices to show a response to business conditions as soon as wholesale prices do, may be due to the fact that retailers are more reluctant to vary their prices and that consumers can often continue to pay or continue to obtain credit for some time after their earnings have been reduced.

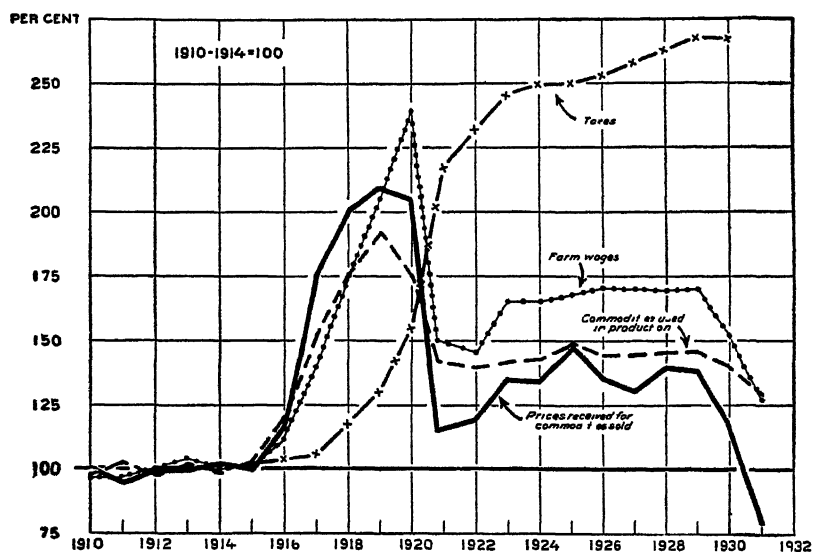


FIGURE 53—Indexes of prices received by farmers and prices paid for commodities used in production, farm wages, and farm taxes, 1910-1931

The ways in which business affects wheat prices are not as clear as in the case of other food products. More than those of many other commodities, wheat prices are determined by world conditions as well as domestic. Being more of a necessity, wheat is less subject to variations in demand than are other farm products. In the business depression of 1920-21, wheat prices fell as did practically all prices and then continued at low levels until the 1924 shortage lifted them above the general price level. Between 1924 and 1929, their tendency has been downward, with some interruptions due to variations in domestic and foreign supplies. Taking into account domestic supplies and foreign demand for United States wheat, the average price received by growers for the 1929, 1930, and 1931 production was considerably less than they would have received had there been no breaks in the stock market since September, 1929, no business recession, and no general world-wide decline in commodity prices. That difference

is represented by most of the gap between the farm price of wheat in October, 1929, \$1.12 per bushel, and a price of only 36 cents per bushel in October, 1931.

### Disparity Between Income And Outgo

From the farmers' standpoint, the greatest hardship that is created by major industrial depressions is the wide discrepancy between prices received by farmers and the prices paid by them, the narrowing of the gap between income and outgo. When prices were reduced by nearly 55 per cent in a period of only a year during the 1920-21 depression, the prices of goods bought by farmers for production purposes fell from 192 per cent of pre-war levels (in December, 1919) to 142 per cent (in December, 1921), a decline of about 25 per cent. Farm wages declined from 239 per cent (of pre-war levels) in 1920 to 150 in 1921—a drop of 37 per cent. Taxes on farm property actually advanced from 155 per cent of pre-war levels in 1920 to 217 per cent in 1921 or an increase of 40 per cent at a most inopportune moment.

The 1930-31 depression has again widened the disparity between certain farm costs and farm receipts. During the 2-year interval between October, 1929, and October, 1931, when farm prices were cut in half and gross returns were reduced by about 40 per cent, prices of commodities used in farm production declined from 146 per cent of pre-war levels to about 123, or about 15 per cent. Farm wages, as in the 1920-21 depression, again declined more than the prices of commodities used in production, the decline in this case being from 174 per cent of pre-war levels to 113 per cent, or a drop of 36 per cent. But taxes on farm property, which reached a post-war peak of 267 per cent of pre-war levels in 1929, remained practically unchanged as prices of most commodities and services fell. The total farm-mortgage debt during the 1930-31 depression was also greater than during the 1920-21 depression and this has meant a greater drain on shrunken farm receipts. It is the failure of these and other cost items to contract when receipts are being halved by financial conditions and decreased demand, and the necessity of keeping the farm running, that leave the average farmer with no net income for his capital and labor during periods of industrial depressions.

L. H. BEAN, *Bureau of Agricultural Economics.*

**FIRE Control Motorized** Suppression of forest fires is beginning  
**in the Lake States** to reflect the increasing use of the gaso-  
**Forest - Land Area** line motor. Fire fighters no longer rely  
entirely upon man power and hand tools.

The Lake States, having relatively smooth topography, a large mileage of roads, and numerous lakes and streams, favor the use of such motor-driven equipment as trucks, tractors, and pumps.

Fire fighters travel mainly with trucks. The single fire guard or smoke-chaser may use a light car with a "pick-up" body. It will carry from one to four men besides himself, and tools for the party. Tools commonly include shovels, axes, a 5-gallon hand pump equipped with shoulder straps, water pails, and perhaps an extra supply of water in 10-gallon cans.

Where roads are good, or a larger crew is required for initial attack, 1½-ton trucks are used. These trucks carry 5 to 10 men, and tools for twice as many. They transport 100 gallons of water or more, a power pump and hose, saws for felling snags, a plow, food, mess equipment, and blankets. A type used in the national forests of the Lake States, and by the State of Minnesota, has compartments in both sides of the body, to separate such unmixable articles as axes, emergency rations, and gasoline. The trucks are customarily painted a bright red like city fire trucks.

### Speed of Attack All-Important

Speed of attack is all-important and good roads enable fire fighters to reach many fires while they are still small enough to be easily controlled. But motors afford power, as well as speed. Where water is plentiful motor-driven pumps often do work impossible for men with hand tools.

An especially promising unit for checking fires is the tractor and plow. Even in heavy going, where several men must clear out fallen trees to let the tractor through, this unit will still build control line faster and better than the same number of men could with mattocks and shovels.

Fire control is greatly facilitated by previously prepared fire breaks, cleared to mineral soil. Where such breaks are parallel to roads the discarded cigarettes of careless drivers fall where there is little or no inflammable vegetation. By using powerful tractors and graders the cost of building such fire breaks is reduced below that of work done with plow and disk.

These developments probably presage many others which will gradually be substituted for hand labor in the struggle for more adequate fire control.

CROSBY A. HOAR, *Forest Service.*

**FLIES Aid Surgeons in Combating a Persistent Bone Disease of Man** The common blowflies have generally been regarded as pests, or at best only as scavengers. Recently, however, they were made to serve a useful purpose when the late Wm. S. Baer, a noted bone surgeon connected with Johns Hopkins University, introduced the blowfly maggot into surgery.

The story of how Doctor Baer began to use maggots in the treatment of osteomyelitis, a grave bone disease from which about 10,000 Americans are suffering, is exceedingly interesting. During the World War, Doctor Baer, who was a surgeon with the expeditionary forces, noted the condition of two soldiers who had been severely wounded and had lain on the battle field for nearly a week. The wounds of these soldiers were full of maggots, but when they were cleaned out the surgeons were impressed with the freedom of the wounds from infection. The men recovered with unexpected rapidity despite their long exposure and harrowing experiences. On the other hand, high mortality occurred among other men, suffering from similar wounds, who were promptly admitted to the hospital and given the best surgical treatment then known. About 10 years later Doctor Baer decided to try putting his findings into practice. Some cases were chosen which were not healing well after operation and a number of

common blowfly maggots were introduced. The results were very encouraging. Doctor Baer soon decided that he must make sure that the larvæ used in wounds were free from dangerous germs. He also found difficulty in having an abundant supply of larvæ available at all times, especially during the winter.

### Entomologists Aid in Producing Aseptic Maggots

The suggestions of entomologists were of value in the early developments, and later a number of entomological problems were undertaken by the Bureau of Entomology in co-operation with Doctor Baer, his associate Miss E. Knight, and other surgeons who had adopted this method of treating osteomyelitis. As a result of this work a very satisfactory method has been developed for producing maggots that are free from disease organisms. This method involves soaking the fly eggs in a disinfectant which will kill the germs but will not prevent the normal hatching of the eggs. The larvæ are reared on sterile food in sterile containers. The food chosen is not very nutritious and therefore keeps the larvæ healthy without causing them to grow much. In this way they may be kept for several days and then, while still small, be transferred to a wound. (Fig. 54.) In the meantime, to determine whether any germs have escaped the sterilizing process, a culture is made from each lot of larvæ and any lot which shows contamination is discarded and therefore never reaches the surgeon. As an additional safeguard against dangerous organisms, the flies that lay the eggs are themselves reared from sterile eggs and are fed sterile water and clean food and kept under reasonably aseptic conditions.

The effect of this artificial type of food on productivity and vitality of the subsequent generations is being studied. Investigations are also being conducted to determine what foods are best for the larvæ, the sunshine requirements of the flies, and the conditions of temperature and moisture which give best results. In this work, quite contrary to usual desires with reference to insect pests, high productivity and maximum vitality are sought.

Another problem with which the entomologist, as well as the surgeon, is concerned, is the manner in which the beneficial results are brought about by the maggots. The present indications are that the maggots not only eat away the dead and diseased tissue, leaving the healthy tissue, but also in some way check the multiplication of the



FIGURE 54.—A mass of sterile maggots in a sterile bottle, ready to be removed and placed in wound by the surgeon

disease germs in the tissues and permit normal healing. To aid in clearing up this problem a more complete knowledge of the physiology of the maggots is being obtained. It is barely possible that this information can be used in the production of a substance which can be applied to the wounds and that we can thus avoid introducing the live maggots.

The work thus far done indicates that any one of several species of our common blowflies may be used in the treatment of osteomyelitis. Those most commonly employed now are the black blowfly and one of

the green-bottle flies, known scientifically as *Phormia regina* Meigen and *Lucilia sericata* Meigen, respectively. These species are sometimes pests of livestock, as they infest soiled wool on sheep. Just what species of blowfly will be most effective has not been determined, but the ease with which the green-bottle fly can be reared and handled makes it a favorite in most laboratories.

The facts that the larvæ of a certain species of blowfly, the screw-worm fly (*Cochliomyia macellaria* Fab.), is a destructive pest of livestock in the Southwest and that numerous cases are on record in which it has attacked man have led many people to

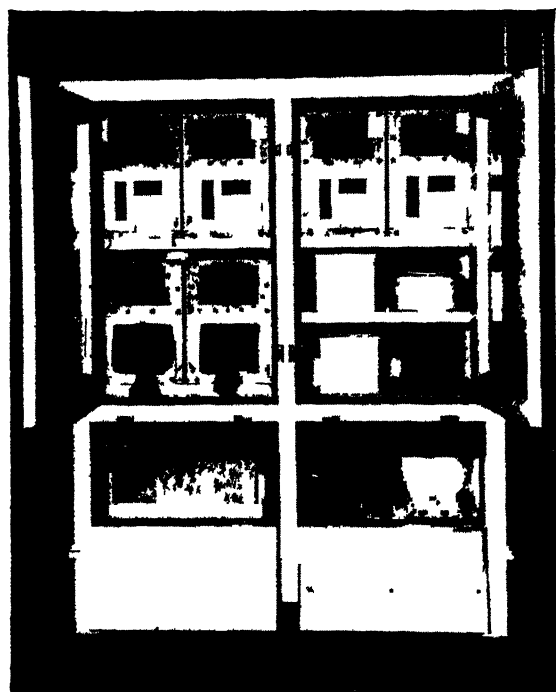


FIGURE 55.—A type of cabinet used in rearing flies and larvæ under controlled temperature and humidity. The doors are opened to show cages and containers. In the lower compartments the heat is supplied by electric-light bulbs at the right, the warmed air is circulated by means of the fan in the middle and is blown over the moist cloths in a pan of water at the left.

fear the maggot treatment of osteomyelitis. There is no danger of such destructive effects, however, if the screw-worm fly is carefully avoided.

For the production of larvæ for the surgeon, the flies are confined in cages in cabinets in which the temperature is kept fairly constant at about 80° F. and the humidity at about 50 per cent. (Fig. 55.) The air is circulated by means of a small fan. The flies are fed sterile sugar water and ripe banana, or a mixture of honey, yeast, egg, and water, although considerable range in diet is possible. At frequent intervals a small piece of clean lean beef is supplied and on this the flies lay their eggs. (Fig. 56.) These eggs are removed and treated with a disinfectant as described, if they are to be used by the surgeon. If they are to produce breeding stock they are put on a piece of meat and kept in a warm ventilated cabinet until mature. The maggots reach full

growth in about five days and crawl away from the food to pupate. The maggot container is then put in a larger one containing sand or saw dust, and in this the larvæ pupate. The adult flies emerge in about a week and are put in the gauze-covered cages for further use.

### Maggots Thoroughly Clean Out the Wound

In following Doctor Baer's method the surgeon performs an operation just as heretofore. A large incision is made, the dead and diseased bone is removed as thoroughly as possible, and a dressing is applied. A few days later, when bleeding has ceased, this dressing is removed and a number of maggots are introduced. (Fig. 57.)

When these maggots become full grown they are washed out and, either immediately or a day later, another lot of maggots is put in. This treatment is continued until the wound is



FIGURE 56 — Clusters of eggs laid on a piece of meat. The eggs are ready to be removed and sterilized



FIGURE 57 — An open wound in upper leg, showing maggots feeding upon the dead bone deep in the wound. The inset is an enlarged portion of the wound and shows the maggots, about life size, closely packed together and feeding with heads downward. This is typical of their manner of feeding in deep wounds.

nearly healed. After the larvæ are introduced a cage with sponge-cork sides and a screen top is usually applied with adhesive tape to keep the larvæ from escaping. They must have air and not too much fluid in

the wound. This means that the wound must be kept open and the surplus discharge drained off. When the larvæ are first introduced the wound is swarming with germs, which, however, decrease rapidly in the presence of the maggots. The healing is accomplished usually in a few weeks, and the scars remaining are much less conspicuous than those caused by other methods of treatment.

Recurrences of osteomyelitis are ordinarily very common. Some patients suffer for years and many operations are necessary. The maggots, however, appear to clean out the wound so thoroughly as largely to prevent recurrences.

Despite its repulsive features, the Baer method is being widely adopted. At the present time more than a score of hospitals in various parts of the country are using it with satisfaction.

Although osteomyelitis is the only disease in which this treatment has been thoroughly tried, there are indications that it may serve a useful purpose in the treatment of other suppurating lesions in both man and animals and perhaps may benefit cases of tuberculosis of the bone, if complicated with other infections. When we think that thousands of patients are affected by osteomyelitis and that a large percentage of them are children, we must conclude that the blowfly is a real benefactor of man.

F. C. BISHOPP, *Bureau of Entomology.*

**F**OOD and Drugs Act's Requirements Apply to U. S. Government's Buying Few people think of Uncle Sam as a buyer of foods. It is true, however, that the Army, Navy, Veterans' Administration, and other branches of the Federal service annually feed thousands of persons and spend millions of dollars for food. And it is essential to assure a clean, safe, and proper food supply and to obtain maximum value for the enormous expenditure of funds. To do this requires rare judgment and a background of fundamental knowledge of the various foods purchased—and their number is legion. Specifications must be drawn with great care so that the food purchased will be suited to its intended purpose, and the food delivered must be rigidly examined as to conformity to the specifications. The Department of Agriculture assists in this purchasing work, acting in an advisory capacity and inspecting samples. During the past fiscal year 4,426 samples of Government food supplies were examined in the Washington laboratories of the Food and Drug Administration.

#### How the Government Selects its Food

Due to the fact that in the official family there is a diversity of class, occupation, and geographical location, it is necessary to provide different types and grades of food in order that they may be suited to the purpose for which they are intended. A prisoner, for example, will not get the same food as a disabled veteran. The essential qualifications and requirements are fully set forth in specifications drafted by a committee appointed for the purpose. Copies of the specifications are forwarded to brokers and manufacturers throughout the country and they are invited to submit bids and also samples of the products they propose to deliver in fulfillment of a possible contract. The samples are judged on the basis of the specification requirements, and the con-

tract is awarded to the lowest bidder whose product meets these requirements.

The contract let and the supplies delivered, the question arises: Do the goods comply with the specifications and does the quality of the delivery measure up to that of the sample submitted? Practically all Government food specifications contain a clause to the effect that all deliveries shall conform to the provisions of the Federal food and drugs act. It is possible, of course, for a commodity to be in compliance with the law and yet be unsatisfactory for a certain purpose. This is due to a differentiation in quality of the foods above the legal requirements. For example, canned fruit is usually graded as fancy, choice, and standard, the last grade being the lowest. If the contractor furnished a grade lower than the specifications called for, a fraud would be perpetrated against the Government; but, if the fruit were clean, wholesome, and properly labeled, no violation of the food and drugs act would occur.

Often a simple inspection—or what the analyst terms an organoleptic test—is sufficient to decide the matter. Then, again, the product can be judged only after careful analyses by chemists and bacteriologists having all the facilities of modern, well-equipped laboratories at their disposal.

Many such laboratories are located throughout the United States. Analyses of food supplies for the Veterans' Administration alone require the constant attention of a corps of trained chemists and bacteriologists. These supplies include practically every known food that comes in a can, besides such staples as flour and cereal foods, cocoa, coffee, gelatin, and dried fruits.

#### Purpose and Value of Testing Foods

This brief article will make no attempt to enumerate all the tests made to ascertain whether or not the various commodities are in compliance with the specifications. There are a few requirements, however, which deserve special mention. For example, the Government insists that canned-goods containers be well filled with food, a requirement made by the food and drugs act. Foods are frequently adulterated with water. Water is a cheap adulterant, costs money to transport, and the law demands that its use be held to the minimum necessary for proper packing. So canned goods are carefully checked for the fill by the measuring of the head space, that is, the distance from the top of the can to the food level, and by draining the contents of the can on a screen of specific dimensions for a definite length of time. With price and quality approximately equal, it is obvious that a saving results to the Government only when well-filled containers are accepted.

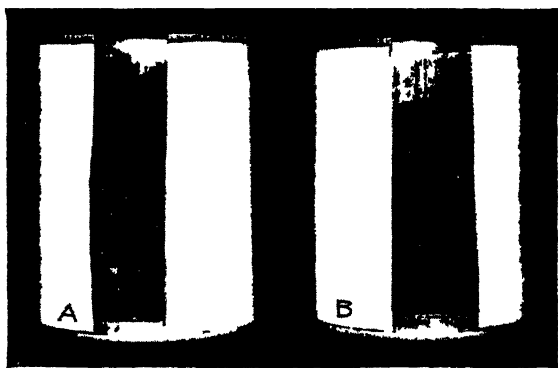


FIGURE 58 — A, Minimum permissible fill, entire contents occupy but 90 per cent of the volume of the closed can; B, improperly filled can; entire contents fill less than 90 per cent of the volume of the closed can

Fat is the valuable constituent of cocoa. Cacao fat has food value and its monetary value far exceeds that of the other constituents of cocoa. Breakfast cocoa must contain not less than 22 per cent of fat, and department chemists see that this requirement is met. In many cereals and farinaceous products protein plays an important part, and here again the chemist assures himself that the protein content is what it should be.

As already said, the direct purpose of the testing of foods is to enable the Government to buy clean, wholesome food of the grade and quality desired, at reasonable prices. The effects of this work are, however, far-reaching, farmers and the food industries, as producers, being benefited. How is the farmer helped? The Federal food and drugs act, the power which motivates this work of testing Government food, requires a well-filled can. This necessitates the production of large quantities of raw materials, requiring a correspondingly greater demand upon the farmer for his products. The well-filled can increases buyer confidence, increasing the volume of business done in food commodities. And, while the general consumer gets no direct benefit from the efforts of the Government to protect food purchases for its own charges, he does derive benefit from the law under which all Federal food purchases are made. And that law is designed to improve the chances of all buyers of receiving what they expect to get for their money, namely, a well-filled can of wholesome food, honestly labeled.

SUMNER C. ROWE, *Food and Drug Administration.*

**F**OREIGN Countries Adopt Variety of Subsidy Plans for Agricultural Relief Agrarian relief has been an important economic concern of many foreign governments during the decade since the war, but especially since the beginning of the world crisis in 1929. Relief measures have been of two general types. One type has sought to lower production and marketing costs. Improvement of credit facilities, tax relief measures, reduction of transportation rates, provision of better storage facilities, etc., are illustrations of this type. The other type has sought to increase the gross income of the farmers by increasing the prices of farm products. On the whole this latter type has been distinctly the more important, and in this category measures regulating internal and external trade have been of outstanding significance. In the present brief survey, attention will therefore be confined mainly to these latter measures.

### Import Restrictions

During the last few years there has been a striking increase in the number and variety of import restrictions designed to increase prices in the home market for the benefit of domestic producers. These have included not only increases in tariff duties but also the employment of more direct forms of restrictions, such as import contingents, government licensing systems, and milling quotas. The system of milling quotas, which involves the establishment by law of stipulated minimum percentages of home-grown grain that must be used in domestic milling, has come into particular prominence during the last year or two.

What has happened with reference to wheat affords perhaps the best illustration of the rise of import barriers. Since January, 1930, the tariff rate on wheat in Germany has risen from 42 cents to \$1.62 a bushel; in Italy, from 74 cents to \$1.07; in France, from 53 to 85 cents; in Austria, from 11 to 55 cents; in Greece, from 40 to 55 cents a bushel, and so on. But these additional duties tell only part of the story. German, French, and Italian millers are required by new milling regulations to use chiefly domestic wheat in their flour, so that the actual tariffs imposed on such wheat as is permitted to enter assume a secondary importance. Other countries, namely, the Netherlands, Sweden, Czechoslovakia, Greece, Estonia, Latvia, Peru, and Luxemburg have been employing this same device. More recently the British Government has announced its intention of establishing such a quota for home-grown wheat.

The only countries which do not impose duties on wheat are Great Britain, the Irish Free State, Denmark, the Netherlands, Norway, and Belgium, and the last three of these impose other import restrictions designed to achieve the same ends. In a number of the importing countries, such as Sweden, Norway, Switzerland, Spain, South Africa, Estonia, and Latvia, there is direct price-fixing and rigid governmental control of imports in support thereof. There have been temporary relaxations of import restrictions when domestic supplies were near exhaustion; but in general these foreign governments have assured their domestic producers a greatly preferred position in the home markets.

### Wheat Restrictions Typify the Trend

What has happened with reference to wheat typifies the trend for all agriculture. Immediately after the war there was a brief period during which the severe war-time restrictions on trade in agricultural products in Europe were somewhat abated and this was followed by a period of increased protection. Until 1929, this protection had for the most part taken the form of tariff increases which did not raise agricultural tariff levels much above those that had prevailed prior to the war. Since the collapse of world prices in 1929, however, the restrictions on imports have rapidly tightened. In Germany, the duties on cereals, meats, and other farm products have been increased several times. In France, Italy, Switzerland, Spain, Portugal, Chile, Mexico, Cuba, Canada, and in many other countries, there have been more or less comprehensive upward revisions of the duties on agricultural products, and in many of these countries other forms of restriction as well have been applied. Even Great Britain has imposed new restrictions on imports of foodstuffs and has announced her intention of extending them further.

### Aids to Exporting Industries

A great variety of measures has been employed to place the agriculture of exporting countries on a more profitable basis. Some of these, such as the international sugar agreement, have been designed to limit world exports and thus to raise the entire level of world prices. Even more directly restrictive, but applying to only a single country, is the Egyptian Government's limitation of cotton acreage. Under recent decrees, the area planted to cotton in the region where Sakellaridis is grown has been restricted to 30 per cent of the total area of land held by any one person. Outside this zone, acreage planted to cotton

is limited to 25 per cent of the total area in the possession of the cultivator.

Most of the government-aid measures in exporting countries, however, have tended to increase exports rather than to diminish them, while at the same time maintaining domestic prices on an artificial level. Most of these measures have tended to promote export-dumping and thus to lower world price levels in the course of the effort to isolate the domestic from the world market. Export bounties and premiums, import-certificate systems (which are, in effect, a type of export bounty), government trading and export monopolies serving as agencies through which the domestic output is segregated for domestic and foreign sale at different price levels—these and other measures have been resorted to in the hope of alleviating distress among producers of crops of which there is an exportable surplus.

### Various Export-Dumping Devices

There is a variety of devices the effect of which is to encourage export-dumping at the expense of either domestic consumers, taxpayers, or both. In detail, these measures differ considerably; but essentially this is the effect of all. One group of illustrations is to be found in the measures taken by the Danubian states in aid of their wheat growers. In Hungary, at the beginning of the crop year 1930, a decree went into effect granting to the producers of wheat a tax-credit coupon valued at 14 cents per bushel, of which any portion left after payment of tax arrears was paid in cash to the grower. This device was continued in the crop year 1931-32. An added provision has gone into effect, however, whereby the growers receive a net credit of 29 cents a bushel, half of which consists of the 14-cent tax-credit coupon carried over from the earlier law, the other half being immediately payable in cash. The funds out of which this bonus to the growers is paid are derived from the sale of "purchasing permits" to dealers in wheat at the rate of 48 cents for each bushel purchased. The difference between this sum and the 29 cents credit to the growers goes for refunding to exporters the sums which they have had to pay out for these permits and for an additional premium to them of 16 cents a bushel on their exports. The export business is conducted through an organization which is, in effect, a quasi-governmental monopoly.

In Yugoslavia, the Government exercises complete monopoly over the commercial wheat crop of the country and regulates internal and external trade in such manner as to maintain internal prices above the world level while selling the exportable surplus abroad for whatever it will bring. The Yugoslavian Government has been paying growers a fixed price, ranging according to grade, of from 77 to 84 cents a bushel in 1931-32, while selling wheat abroad for little more than half these prices. In Bulgaria a system is in effect whereby growers receive directly from the Government a guaranteed price of 67 cents a bushel, 70 per cent of which is payable in cash, the remainder in taxation bonds offerable against tax arrears. In Bulgaria, as in Hungary and Yugoslavia, the grain-control system is handled through a central purchasing and exporting organization. In Rumania, the Government pays an export premium of 16.1 cents a bushel.

## Treaties to Facilitate Exporting

To facilitate exports the Danubian countries have been negotiating treaties with other European countries designed to secure for Danubian cereals and some other products preferential entry into the markets of these other countries. Some of these treaties provide for reduction of duties on definite quotas of stipulated amounts; others are less definite.

Other instances of export aid may be cited. Poland pays an export premium of 18 cents a bushel on wheat and also premiums on rye and barley exports. In Canada the Government is paying in 1931-32 a direct bonus of 5 cents a bushel (equivalent, at current exchange as of December 31, 1931, to 4.2 cents) to wheat growers in the prairie Provinces. More recently, the Australian Government has adopted a bounty of  $4\frac{1}{2}$  pence per bushel (9.12 cents at par and 5.08 cents at current exchange as of December 31, 1931) for this year's wheat crop. South Africa and Southern Rhodesia have established Government controls over the corn-export trade for the purpose of raising domestic prices above the world level. The principles involved are essentially the same as those employed to this end in Yugoslavia and Hungary in respect to wheat. The Government so controls the corn trade as to enable it to segregate supplies for sale in the domestic and foreign markets and to maintain domestic prices above the world level while selling the exported portion abroad at whatever price it will bring.

LYNN RAMSAY EDMISTER,  
*Bureau of Agricultural Economics.*

**F**OREST Administration  
Must Correlate Grazing  
and Recreation Needs

Forest officers responsible for range management and recreation in the national forests are often confronted with the problem of the proper correlation of two forms of conflicting land use—recreation and grazing. In establishing national forests to assure a permanent supply of timber and the protection of valuable watersheds, large areas supporting forage growth, formerly used by livestock, were unavoidably included. The old plan of first come first served, without regard to numbers of livestock or season of use, had resulted in range deterioration and serious erosion. Fundamental principles of range management were immediately put into effect by the Forest Service, and now on all important grazing forests, management plans provide for classifying each range and allotting to it the class of livestock to which it is best suited, regulating the period of use to plant growth requirements, limiting the number of livestock grazed, and giving due consideration to the needs of game animals and other national-forest resources.

The national forests have also been used for a long time for recreation. This use, comparatively small in the beginning, has increased by leaps and bounds throughout practically all of the national-forest regions. In California only a few thousand people used the forests for recreation 25 years ago; now more than 16,000,000 people visit them annually and some 3,000,000 make considerable use of them. This use includes nearly 6,000 municipal camps, auto camps, airplane landing fields, and many other recreational developments, and recreation

management plans have been developed for each national forest in California.

In developing these plans, correlation with grazing and other uses of national forest lands was necessary. Intensive recreational development and use was confined to the most desirable and accessible areas, while grazing was restricted to more remote areas. Where the class of livestock grazed was in conflict with recreation, a change in the kind of livestock was made.

### Aids to Travel Off Beaten Paths

Forage is reserved at suitable and convenient places to facilitate travel with pack and saddle horse off the beaten paths. This is accomplished by the establishment of small pastures along regular routes of travel, placing of short stretches of fence across canyons connecting with natural barriers, recognition of packers engaged in transporting tourists and supplies, and the issuance to commercial packers of permits covering pack and saddle animals.

Under this arrangement thousands of people travel about the national forests annually and enjoy fishing, hunting, recreation, and the scenic beauties of these mountains.

Closely related to grazing and recreation is the wild-life problem. No single use of national forests has greater recreational value and such possibilities for conflict with grazing as the use of ranges by game animals. This is especially true in California because of the variety and number of deer. To provide these animals with adequate food, domestic stock is reduced in numbers on large areas or excluded altogether. More than 2,000,000 acres of national-forest lands in California are given special grazing supervision for this purpose.

With well-developed recreation and wild-life management plans, the use of the national forests in California is increasing rapidly, while the use of the ranges for the grazing of domestic livestock is being maintained.

J. W. NELSON, *Forest Service.*

**F**OREST-FIRE Protection by Cooperative Agreement Under the Clarke-McNary Law Cooperative forest-fire protection, in which the Federal Government shares under section 2 of the Clarke-McNary law, contemplates adequate protection of the 417,051,000 acres of private and State forest land outside of the national forests. Forty States, from southern California with its valuable watersheds to Oregon with its immense Douglas fir areas, from Maine's spruce lands to Florida's young pine, have forest land requiring protection, and no one system would fit the different conditions found in these various regions. Responsibility for supervising the cooperative fire-protection work lies with the States, although the work is inspected and the accounts are examined by Federal inspectors.

Organization, financing, and technic of fire control are, as far as possible, fitted to the conditions of each particular State. The generally accepted principle is that private landowners should pay one-half the cost of protecting their forest land, the other half being shared equally by the State and Federal Governments. A few States have

laws requiring landowners to pay their share; other States depend upon voluntary contributions. In some States, however, the owners are carrying a larger burden than are the State and Federal Governments.

It is generally impracticable to obtain material financial cooperation from owners where forest land is held in small tracts, and public agencies usually assume full responsibility. Financial cooperation from the counties is common in the Eastern States. Under any plan of financing much valuable cooperation is obtained from landowners without cash outlay.

### Owners' Protective Associations

In some regions where the land is held in large tracts and the owners have a keen appreciation of the value of the timber and the damage done by fire, owners commonly organize forest-fire protective associations, under the leadership of the States. Assessments to provide funds for use by these associations may be voluntary or required by State law, and the associations customarily manage their own fire-control organizations under a plan mutually acceptable to the association and the State. The work is inspected by the State and the association receives financial aid from the State and Federal Governments.

The West Virginia State law provides that unless the forest-land owner gives satisfactory protection to his land the State may collect 1 cent an acre from him for protection supplied by the State. But because of lack of funds to administer this law, it has not been given State-wide application. However, two large associations covering nearly 2,000,000 acres were formed several years ago. Each member pays into the association 1 cent for each acre of forest land owned by him within the association area. The State obligates itself to pay an equal amount from State and Federal funds. In addition, the counties are required by law to pay the cost of temporary labor and supplies used in fighting fire, when such costs are authorized and the accounts verified by State officers.

### Managers are State Employees

The field managers of the associations are employees of the State, which pays most of their salaries. Semiannually each field manager reports on the work and submits a working plan and budget for the next half year, which must be acceptable to the State forester and to the association. Direction of the work is left to the field manager, or district forester, as he is usually called. He must see that lookout towers, telephone lines, and fire tools are in good condition before the opening of the fire season. (West Virginia has a fall fire season in October and November, and a spring fire season in April and May.) He directs and carries on an educational campaign for fire prevention. He observes weather conditions; employs lookouts, rangers, and wardens, and places them somewhat in advance of dangerous fire weather. During bad fire weather he keeps in close contact with the organization, and is alert for critical situations which require shifting of man power or expert direction to prevent large fires with heavy suppression costs.

C. F. EVANS, *Forest Service.*

## **F**OREST-FIRE Protection Involves Detailed Planning of Transportation System

The time elapsing between the start of a forest fire and the arrival of fire fighters may mean the difference between quick suppression and a disastrous conflagration. Consequently, the Forest Service, in planning for fire protection in the national forests, must determine for each area the necessary "hour-control," or the maximum time that a fire can safely be allowed to burn in a given fuel type under "average bad" conditions before the first suppression forces arrive. A portion of the hour-control interval is needed for discovering and reporting the fire and for get-away. What remains is available for the firemen traveling to the fire. Hour-control time is determined by the value of resources, the degree of inflammability, and consequent rapidity of action deemed necessary to hold losses below a specified limit.

The objective of the transportation planning is the design of a transportation system, together with the placement plan for protection personnel, which at the least annual cost per unit of area will enable fire fighters to reach any fire within the allowable travel time.

Planning on the basis of reaching an entire area within the prescribed travel time will usually result in a large overlapping in coverage from various protective positions. Also certain relatively small portions can be brought within the allowable travel time only at excessive cost. As a result of balancing costs against benefits, it may be decided in such cases that the instructions for the planning should provide (1) that some definite percentage of the total area shall be within the prescribed travel time, (2) that the area of any unreached block shall not exceed a stated size, and (3) that practically all points in such a block shall be within a different but greater travel time.

### Several Layouts May Be Necessary

The desired coverage can usually be secured with several different layouts of transportation facilities and men. Obtaining the best possible combination of men, roads, and trails would be well-nigh hopeless if the cost per square mile and the most efficient distance between firemen had not been ascertained for various combinations of speed of roads, trails, and cross-country travel, allowable travel times, and annual costs for firemen, roads, and trails. The layout upon which the data are based can seldom be completely attained. The data are used as a guide to determine the nearest possible approach to the assumed system in which project costs average those on the ground.

The specifications for building the transportation plan cover the allowable travel time, both first-line and second-line defense, for each fuel type or zone of inflammability within the area.

First-line defense ordinarily consists of one man available to be sent to a fire at any time. More men are used where conditions call for them. Second-line defense bases are those where fully equipped crews of not less than the minimum size required for second-line purposes can be obtained. In the design, speed ratings, and cost estimates, first-line men on or near roads are considered as equipped with light automobiles. For second-line forces, the 1½-ton capacity truck is ordinarily the standard.

The next step in planning the transportation system is to secure field information and data. For each existing road and trail the man making the plan must know the location, speed standard during the fire

season, the cost to raise this standard, and the annual maintenance cost. Similar data are needed on all proposed and possible routes for roads and trails within reasonable cost. Comparable information is needed for water routes. Knowing the present efficiency of the existing system for first and second line defense it is now necessary to develop a planned system satisfying the specifications.

### Area that Can be Covered is Mapped

Starting with the first fireman, and using the proper speed for each existing travel route, the area which he can reach within the prescribed travel time is worked out. For instance, if two hours are allowed, and the fireman is located on a road with a speed standard of 15 miles within an hour, he can travel 30 miles in each direction within the allowed time. With a cross-country foot-travel speed of 2 miles he can go out 4 miles on each side of the road opposite his station, 3 miles from a point on the road  $7\frac{1}{2}$  miles away from his station, etc.

The area covered by each existing fireman within the allowable time limits is indicated on a map. The next step is a similar mapping of second-line coverage. Every combination of existing routes is utilized.

A computation of the annual cost of the present system is then made. This is based upon the area within the specified travel time for first line defense. For roads and trails, the costs include the annual maintenance charges necessary for protection use plus a percentage of the construction investment required to build to the standard necessary for protection. For firemen, the costs include such portion of wages, including subsistence, as are chargeable to protection. For improvements at firemen's stations, the amount is such portion of the annual depreciation plus annual maintenance as is chargeable to first-line defense.

The planning work so far done has shown to what extent the present transportation system and protective organization fulfill the requirements. The probability is that there will be a great duplication in coverage in certain sections while other sections will be far beyond the travel allowance. Cases of 100 per cent duplication will be infrequent but the maps will show many instances where the coverage can be improved by changing the location of firemen or by raising the speed standard of existing roads.

### Means of Improving the System

The next step is to find the best means of improving the system so that it will satisfy the specifications. Maps and transparent overlays are used in working out the best combinations. All possible and proposed routes of travel which seem practicable from a cost standpoint are determined. Men are shifted where insufficient or duplicate coverage dictates such procedure. New positions are introduced where needed. Existing routes are altered in speed if necessary or abandoned if found of negligible value. Possible new routes are utilized when required and assigned the speeds found most economical. The final result should be a coverage for the first-line defense of not less than the minimum percentage specified as acceptable, and a transportation system approximating as closely as practicable in ground plan and speeds the objectives sought.

Starting from the second-line supply points, second-line coverage is worked out by the same methods. It is extremely unlikely that the crew coverage will be satisfactory upon first trial. If it is, the system satisfies the specifications for both first-line and second-line defense. If not, changes must be made to secure the required second-line coverage. The changes will usually be a substitution of roads for trails and an increase in length or speed of planned roads.

It is now necessary to coordinate the first and second line defense plans. Through balancing back and forth between first and second line overlays, the final system is determined. Unit costs are computed in the same manner as for the existing system.

Variations in the method of planning may prove advisable because of unusual conditions. In certain cases, the use of air transport to supplement ground travel may be practicable.

### The Final Check

The final check of the plan is made in the field and covers the feasibility of planned routes, correctness of cost estimates, practicability of securing planned speeds at estimated costs, suitability of construction standards, and correlation of planned locations with routes needed for utilization of the forest resources and other purposes.

Effectiveness in expenditure requires close correlation between the transportation plan and the fire detection plan. While both plans could be made independent of each other, there is the possibility of so locating some men that they may serve both for detection and for suppression. When the two plans have been worked out, it appears that it will be relatively easy to determine the communication system that at least annual expense will render adequate service for protection as well as for administration.

T. W. NORCROSS, *Forest Service.*

## FOREST Fires Are Often Fought With Water in California

The shovel and ax have always been the standard forest-fire-fighting tools in California. Other tools have been adapted or invented for removing inflammable material from advancing fire, the method being to construct a fire line or trail and enable fire fighters either to stop the fire directly or afford them a place from which to back-fire.

Water was never, until recent years, considered a practicable means of controlling forest fires, largely because it was scarce in regions of fire hazard. In the earliest days of the Forest Service, however, water was used, usually in "mopping-up" a fire. Thus originated the 5-gallon orchard spray pumps. They were heavy, however, and difficult to carry, and were but little used.

About five years ago the first back-pack pump outfit was adopted for fighting forest fires. Now a very essential part of fire-fighting equipment, the outfit consists of a 5-gallon galvanized-iron water can carried on the fire fighter's back. A hand force pump is connected to the can by a short length of hose, and various types of nozzles are used. The outfits are very efficient in extinguishing grass fires and subduing hot brush or reproduction fires so that men following the pump operator can work with axes, shovels, and other tools. After a fire has been stopped and a fire line constructed around it, these pumps extinguish burning material.

### Portable Power Pumps

The use of back-pack pumps indicated the value of water judiciously used; the great need was to obtain more water. Many different types of portable power pumps have been developed, most of which can be carried by one or two men. Capacities vary, but pumps delivering 35 to 40 gallons per minute at 135 pounds pressure through  $\frac{3}{8}$ -inch nozzle openings are very effective. One thousand to fifteen hundred feet of  $1\frac{1}{2}$ -inch hose in 50-foot lengths are carried with each unit. A truck transports the unit as far as possible and it is carried by pack horse or man power to water near the fire. Although a large number of forest fires in California are beyond reach of water even with a pump and 1,000 feet of hose, such a portable pump is often needed, and each fire truck carries one.

The next step is the tank truck, practical use of which depends entirely upon road development. (Fig. 59.) During the last five years road construction within California's national forests has made many hazardous areas accessible to the motor truck, but on many such areas it is not yet feasible to use tank trucks. For this reason and because of lack of finances, the Forest Service has lagged behind the State and some county fire-fighting organizations in the use of tank trucks. These agencies protect areas of denser population at lower elevations, where road systems are much more complete.



FIGURE 59—Fire truck washing out fire along Pacific Highway. Shasta National Forest

The most efficient use of tank trucks demands numerous sources of water. On many hazardous areas water is scarce, and it must be collected in tanks or reservoirs from small streams and springs wherever practicable. Such storage development is expensive, but through the cooperation of another Government bureau the Forest Service has obtained 75 redwood tanks varying in capacity from 300 to 15,000 gallons.

### Equipment of Tank Trucks

The tank trucks in use vary in capacity from 250 to 400 gallons, are equipped with either rotary or centrifugal pumps, and are usually driven by power take-offs on the transmission. They should at least be capable of delivering an effective stream of water through 1,000 feet of  $1\frac{1}{2}$ -inch hose, with the point of delivery up to 200 feet above the truck. Suction hose is provided by means of which water can be drafted from streams. A thousand feet of  $1\frac{1}{2}$ -inch hose is carried in 50-foot lengths and there may be additional amounts of  $\frac{3}{4}$ -inch or 1-inch hose on reels. Through Siamese connections several different streams of water can be directed from the same truck simultaneously. Shovels, axes, etc., and 10 to 12 water back-pack outfits ready for instant use, are auxiliary equipment.

The immediate needs are speedy transportation through the construction of adequate road systems and consequent use of more powerful trucks, development of all needed sources of water supply, and the training of personnel in speedy and efficient use of water.

WALTER E. JOTTER, *Forest Service.*

## **F**OREST Management of Cut-Over Land Aims at Uniform Yield Annually

Ponderosa pine stands in Arizona and New Mexico contain trees of all ages from seedlings to old timber ripe for harvesting. In harvesting national-forest timber young, fast-growing trees and sufficient healthy well-formed larger trees are reserved to insure a new crop on the cut-over area. The number of trees reserved depends on the amount and condition of the original stand, and while the stand consists of various ages the volume of timber in each age class will vary on different areas. Abundance of young growth shortens the time for establishing the new crop. In the absence of reproduction four seed trees over 20 inches in diameter 4½ feet from the ground are reserved on each acre. Young timber and seed trees grow more rapidly after the area is cut over. When the cut-over area again bears enough timber to make cutting profitable another crop can be harvested.

In managing national-forest timber it is essential that the annual yields of timber be approximately equal. The virgin timber should be made to last until the new crop on the cut-over land is ready for cutting. Growing timber is a long-time undertaking and it is necessary to find out how rapidly the timber left on cut-over land is growing. It is the policy to determine the volume of timber left on the cut-over areas as soon as cutting is done, and later at intervals of from 10 to 20 years. The difference in volume indicates the total growth, and these data are used to determine how rapidly the old timber can be cut to insure a sustained timber business.

In 1907 a section of timber, near the edge of the timber type, on the Coconino National Forest, Ariz., was cut over. The site was dry and the original stand of timber light. There was cut from the section 2,208,000 board feet and a stand of 840,000 feet was reserved. In 1930, the volume of timber was found to be 1,390,120 board feet, a growth of 550,120 feet, or 23,918 feet per year. In view of the light stand reserved and the rather difficult site conditions, the growth is considered excellent. Better stands of timber on better sites show annual growths of 75 to 100 feet per acre of cut-over sale area. The reserved stand plus the growth will make profitable cutting in from 50 to 75 years, and shows the advantage of reserving young timber and seed trees when cutting timberland in the Southwest.

QUINCY RANGLES, *Forest Service.*

## **F**OREST Resources Can Be Wisely Used Without Hampering Recreation

Are those who use the national forests for recreation aware of the need for proper forest management which recreational use entails? A group of trees, a green mountainside, a good supply of game, all furnish refreshment and diversion. Consequently, people who love the outdoors, and who frequent the mountains and forests, want resources conserved. So

ardent do they become sometimes that they insist on no cutting of timber, no grazing, and no hunting whatsoever.

But while seeking to preserve, they may easily set up conditions that will have an entirely opposite effect. What happens if man never cuts any trees? Often 30 or more seedlings start to a square foot, or over 100,000 to the acre. Competition for light, moisture, and soil nourishment is very severe and obviously many trees must die and be wasted before others can get room enough to reach large size. Eventually, old age, fungi, insects, or fire will destroy the remainder. This sort of protection has little in its favor. On the other hand, if man had harvested and used the surplus and mature trees before they rotted, the remaining trees would have grown faster. Harvesting need not mar the beauty of the landscape.

Denuded mountainsides, polluted water, and camp grounds frequently damaged by livestock have aroused the ire of nature lovers, but millions of acres in the West produce valuable forage that in many instances can be utilized without harm to recreational or aesthetic values. Livestock even contribute to these values. Bands of well-managed sheep grazing peacefully on the slopes add life to mountain scenery, and grazing cattle often draw attention to beautiful mountain meadows.

### Even Game Must Be Thinned

Ruthless destruction of big game has brought about the closing of large areas to hunting. But even this sort of protection has its dangers. Game must eat. Their range can not be overstocked without damage. Regulated use of the surplus game is absolutely essential. Otherwise the herds will suffer from shortage of food, reduction in the rate of increase, and disease.

People seeking recreation in the forests get their diversion and refreshment by activities that stimulate both mind and body. Real physical recreation comes as the result of effort, and there is a real stimulus in the study of flowers, trees, rocks, and animals.

A scientific interest in making trees grow better and faster and an understanding of the difference between wise use and useless waste brings an added pleasure in forest recreation. With the increase in population and the growing concentration of people in cities, the desire and need for mountain playgrounds increase. The number of visitors to the national forests has jumped 1,000 per cent since 1917. More and more people are learning the value of outdoor recreation and feeling the need for it. But their recreational tastes can and should be developed to appreciate those arts which not only preserve, but produce more beauty, those arts which intelligently harvest forest crops that would otherwise be wasted.

DANA PARKINSON, *Forest Service.*

**F**OREST Restoration a Complicated Job on the Eastern National Forests Within many of the eastern and southern national forests, cutting and disastrous fires have taken all the virgin timber on large areas and left the land almost totally devoid of merchantable growth. In many cases, repeated fires have destroyed seed trees and reproduction, and seriously lowered the productive capacity of the soil. Forest weeds,

such as pin cherry, hercules club, sassafras, and scrub oak, frequently cover such areas, and briars, annual weeds, grasses, ferns, and mosses are often abundant. Natural reforestation of the area by valuable timber species decreases because of the lack of seed trees and the unsuitable seed bed, while the undesirable cover increases.

Where such areas exist, careful planting surveys must be made to determine the amount of planting stock of suitable species and age classes that must be produced in the nursery for reforestation purposes. The chief forest nursery in the eastern region is located at Parsons, W. Va., on the Monongahela National Forest. It has an authorized capacity of 3,000,000 trees annually, largely red spruce transplants. (Fig. 60.)



FIGURE 60—The Parsons nursery, Monongahela National Forest, W. Va

At Russellville, Ark., the Ozark nursery is operated on a basis of 1,000,000 shortleaf pine seedlings annually. Small experimental nurseries are located on the Ocala and Choctawhatchee National Forests in Florida.

Any reforestation program demands an adequate supply of seed. Many tree species grow over a wide geographic range, and it has been proven that seed from the southern portion of the range of a certain species is not suited to the production of planting stock for use in a decidedly more severe climate. It is essential, therefore, that seed be collected from thrifty trees in a location climatically similar to the area on which the young trees are to be planted.

#### The Handling of Planting Stock

Planting stock must be lifted just prior to the planting season, sorted, counted, bundled, packed, and shipped by train or truck to the planting site. Here it is heeled in until planted. Most of the planting

on eastern national forests is done in the early spring, although in the southern pine region, the planting season is from December to February. Planting camps are usually organized with sleeping quarters, mess tents, and tools. Planters are hired locally—farm or woods labor being preferred. Crews of from 10 to 14 men are used, each crew in charge of a trained foreman. On the more northern forests, such as the Monongahela and Allegheny, the square-hole method of planting is used. The hole is dug with a mattock or special planting hoe, the tree is set in the center of the hole, and the earth firmly tamped around it.

Conditions on the Monongahela, in West Virginia, are similar to those on the Allegheny National Forest in Pennsylvania. (Fig. 61.) The brush, if not too dense, provides some protection for the planted trees, and does not greatly hinder the work of planting. The ground cover, however, and especially the mass of roots in the top layer of soil, makes planting more difficult, and lessens the moisture available for the planted trees.

Well-developed planting stock carefully planted is essential in securing good survival. Norway pine and Norway spruce have given the most promising results so far on the Allegheny, while red spruce is best suited to the Monongahela.

On the Ozark National Forest in Arkansas, the areas to be planted



FIGURE 61.—Crew at work on a typical area in need of planting, Allegheny National Forest, Pa.

are old fields, most of which are no longer suited to cultivation. Short-leaf pine seedlings are planted on these areas in order to enable them to produce once more the crop for which they are best suited—timber.

In Florida, on the Choctawhatchee and Ocala National Forests, the problem is to plant longleaf pine on dry, sterile, sandy soils, devastated by repeated fires. The fire hazard is high, and scrubby oaks and other brush offer serious competition.

Experimentation to develop an effective technic prior to extensive reforestation is now under way on both the Choctawhatchee and Ocala.

With a tap-rooted species, such as longleaf or slash pine, the slit method of planting is satisfactory and economical. A vertical slit is made in the soil with a planting bar and the roots of the seedling are inserted in the slit, which is then closed by pressing the earth firmly against the roots with the planting bar and the heel.

Fire is the most serious enemy of planted forests. Plantations must be protected by firebreaks, roads, and trails, and during dangerous periods by lookouts and supplementary patrol.

Severe drought causes losses in plantations. Weak trees and those poorly planted are less able to survive extreme conditions than thrifty

trees carefully planted. Rabbits, porcupines, insects, and diseases may also become destructive to plantations.

On the Allegheny National Forest deer cause considerable injury by browsing the young trees. Areas which show evidence of intensive use by deer should not be planted.

White pine is not being planted extensively on eastern national forests because of the prevalence of the white pine weevil and the white-pine blister rust. This species is being used, however, to a limited extent on the Shenandoah, Natural Bridge, Unaka, and Pisgah National Forests. On the Shenandoah, wild currants and gooseberries (*Ribes* spp.), alternate hosts for the blister rust, occur and a definite program of eradication is under way. The disease, however, has not yet been found south of Pennsylvania. South of the Shenandoah there is little danger of infection of pine stands.

Artificial reforestation on the eastern national forests is by no means a simple task; it is complicated and arduous. Saw timber, pulpwood, and other forest products from acres now idle, and the regulation of stream flow will, however, justify the effort and cost.

L. S. GROSS, *Forest Service*.

## FORESTRY Is an Aid to the Farmer in Controlling Erosion

Soil is the farmer's greatest asset, and the prosperity of any nation is dependent upon this basic element. American farmers have had so much good farm land

that its abundance has often led to careless use or even to complete destruction of this most valuable resource. Erosion or soil washing



FIGURE 62—This steep hill land should have been kept in woodland. After a few years of careless and unprofitable cultivation it has been abandoned. The old corn rows running up and down hill are rapidly becoming a maze of gullies.

has probably ruined more good farm land than any other single factor. (Fig. 62.)

Threatened loss of his farm by financial disaster would stir the owner to action, but gradual loss by erosion seldom worries him until

the damage has been done. Farm land is being lost gradually by erosion on cultivated hill lands throughout the country, especially where soils wash easily and rains are heavy.

The farmer is often not aware that sheet erosion or surface washing is taking the fertile topsoil until crops begin to show its effect, and then he usually believes that the crops have exhausted the land. If sheet erosion is unchecked gullies develop, and the farm may eventually become a hopeless waste and productive land may in a few years become a liability. Soil erosion is responsible for the loss of many farms through indebtedness (Fig. 63)

Preventive measures such as terracing, use of cover crops, and deep cultivation may be very effective in checking erosion on slopes up to 10 or 15 per cent. On steeper slopes and on areas subject to severe



FIGURE 63 —With lack of foresight this farmer cut and burned young pine. He hoped this field would develop into a pasture but instead the area will soon be a gullied waste. The pines, if protected from fire, besides saving the land, would in a few years have produced a valuable crop of timber

washing, or on land already in gullies, a stable vegetative cover is necessary. A good grass sod or covering of vines may be sufficient, but trees are one of the most effective means of preventing or controlling soil movement. If properly managed and protected from fire and excessive grazing a forest cover will also yield the farmer an income in the form of timber, posts, and fuel wood. Foresters are giving increasing attention to the part forestry plays in solving the farmers' soil erosion problem.

### Black Locust Widely Useful

Black locust is well adapted for controlling erosion over wide sections of the country. It grows rapidly and produces a vigorous, spreading root system that holds the soil in place. Furthermore, it is a legu-

minous plant which adds nitrogen to the soil. The wood is very hard and durable, and of particular value for fence posts.

For nearly 20 years farmers in parts of the central hardwood belt have been reclaiming gullied land by planting black locust. In many instances this formerly waste land valued at \$1 or \$2 an acre has in 15 years yielded 500 to 1,000 fence posts per acre. At 20 cents a post this represents a gross income of \$100 to \$200 per acre, returns which compare favorably with profits from cultivated and pasture land.

Other trees may prove as successful as black locust in stopping erosion although this has not yet been thoroughly demonstrated. Several experiments are now under way, particularly in the seriously eroded hills in northern Mississippi, by the Southern Forest Experiment Station.

Farmers can prevent much erosion if they will use caution in clearing slopes above 15 per cent. If the soil on steep slopes is left unprotected, erosion will usually render the land worthless for agricultural use within a few years.

Two recommendations are made to upland farmers, particularly to those located in the silt loam uplands and bluff soils region: (1) Keep steep slopes in woodland, thereby protecting the soil from erosion and assuring a continuous supply of timber, posts, and fuel; and (2) on land that is starting to erode, or already in gullies, plant trees which will keep the area productive.

J. D. SINCLAIR, *Forest Service.*

## FORESTRY Is Reclaiming Cut-Over Charcoal Lands in Southern Appalachians

In the foothills on both sides of the historically rich Shenandoah Valley, the ironmasters who operated the old iron furnaces unintentionally began an experiment in forest management over a century ago which now provides opportunities for the modern forester. (Fig. 64.) To produce the charcoal necessary in the smelting process, thousands of acres of timber were cut clean. Occasionally, the same area was cut over two or three times.

These "coalings" came up to fine stands of second growth, but the ironmasters did not understand fire control. When a fire occurred large crews went out to fire around the area being cut, which spread instead of checked the fire. "Turning the red bull into the woods" was the usual habit of small farmers who had a few cattle to graze. Bark peelers operating in areas adjoining the old coalings invariably set fire to the forest just before the peeling season as an insurance against burned bark. When not fatal to the trees, these fires resulted in scarred butts, retarded growth, and poorly formed trees.

As iron industries shifted to more profitable fields, the furnaces were closed down and the ironmasters sold their agricultural holdings, retaining only the more rugged, mountainous lands. In 1911 the Government started to acquire these lands, under authority of the Weeks law, and with their inclusion in the Shenandoah National Forest began the effort to repair the damage caused by repeated fires. In 1914, however, chestnut blight made its appearance, spreading south from Maryland. As chestnut comprised 20 to 60 per cent of the young stands, the importance of this disease is apparent. Control measures were soon found to be futile and steps were taken to salvage the chest-

nut. Fortunately, a ready market existed in stave mills manufacturing barrels for Virginia apple growers. Thousands of cords of stave wood, chiefly chestnut, were cut from the coalings, along with other species of low value for saw timber or special products. (Fig. 65.)

### Some Coalings Not Severely Burned

A few old coalings, however, escaped fire, or at least were not burned severely. The Mollies Hill area, which supplied wood to the old Crack-Whip furnace on Trout Run, came into Government ownership supporting a fully stocked 100-year-old stand of mixed hardwoods in which white and chestnut oak predominated. Density of the stand had retarded growth. It was first thinned and the chestnut removed for telephone poles. Then a saw-timber sale took out the less desirable oaks and the defective individuals of all species. Finally, the tops and unmerchantable trees

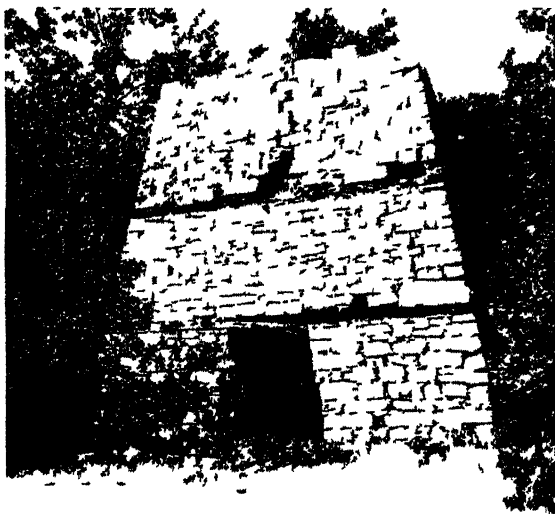


FIGURE 64—Ruin of an old iron furnace on the Shenandoah National Forest



FIGURE 65—Stave-wood and fuel-wood piles have removed fire scoured, defective, and weed trees from this young oak stand

were sold for fuel wood. The result is a thrifty, rapidly growing stand of valuable species which will be ready for another saw-timber cutting in 25 to 30 years.

In stands too small for saw timber, stove-wood sales remove the larger chestnut and inferior species, and fuel-wood cuttings take out everything else except the trees selected for the final stand. The object is to leave the proper number of trees of the best species to produce the maximum amount of most valuable wood products in the shortest time. Already hundreds of acres of these fire-scarred young stands have been placed in satisfactory condition for rapid growth through sale of defective and weed species at a net profit.

R. M. EVANS, *Forest Service.*

## **F**ORESTRY 4-H Clubs Carry on Broad Program in the Central States

Forestry is a relatively new project in boys and girls' 4-H club work. Forestry clubs are organized in more than half of the 13 Central States, with approximately 2,000 4-H club members enrolled. The project is carried on with the expectation that, through this phase of extension work, farm boys not only will come to have a better understanding of the forests and be led to recognize the existence of forestry problems, but that they will also learn how to conserve the present wooded areas and will become interested in providing forests for future use.

The practice and knowledge gained from satisfactorily completing this project do not, necessarily, make foresters of the boys, but do equip them with the ability to appreciate the forests, to know how to handle and protect the woodlands on their own farms, to participate in reforestation and forest-fire-prevention activities, and to assume their part in boys and girls' 4-H club work.

### **Supervised by Extension Agents**

The 4-H forestry clubs are supervised by the extension service in the State concerned with the Office of Cooperative Extension Work, United States Department of Agriculture, cooperating. The organization of forestry clubs is under the direction of the State club leader and the county extension agent. The subject-matter material for this project is prepared under the supervision of the State extension forester. The local club leader directs the activities of the boys who enroll in any given local club.

### **Carry On a Variety of Activities**

The 4-H forestry club boys engage in a wide variety of interesting activities. Among these are reforesting land areas on their own farms or on land obtained for this purpose, planting windbreaks or shelter belts about the farmstead, making improvement cuttings in the farm woodland, gathering tree seeds for their own use or for sale, and establishing private nurseries with the end in view of growing their own planting stock.

The great majority of 4-H forestry club members reforest a certain land area each year, looking toward the future ownership of a sizable piece of growing timber. In most of the States this accepted proce-

ture is supplemented by group activities in which the entire club participates.

Forestry pageants are presented, exhibits are made at county and State fairs, demonstration teams are trained, hypsometers, calipers, and Biltmore sticks are made and used, fire lines are constructed when the size of the timbered area warrants, inspection trips are made to wood-utilization plants, and tree-identification hikes are taken. In certain States, the work of the older 4-H forestry club boys is recognized by the State authorities, who appoint them assistant State fire wardens.

Wisconsin leads in establishing school forests. The land, which usually is provided by some organization such as a lumbering company or a chamber of commerce, is deeded to the local school. Each year the club members reforest a definite area so that within a stated number of years the entire area will be covered with growing trees of different ages. Both Wisconsin and Michigan hold forestry-club camps where instruction is given by trained foresters, and where the boys enjoy the experience of camping out.

Iowa conducts a farm grove history contest which provides a means whereby farm youths become familiar with the history of the woodland on their own farms. In Minnesota a civic forest is now being developed by a forestry club which instituted the plan with the assistance of the village authorities. In the mining section of Minnesota the boys sometimes utilize the ore dumps for their planting. Ohio boys who live in the coal-mining section often do their planting on the mine strips when other land is not obtainable.

Such slogans as "Plan to plant another tree," "Have boys and trees grow up together," and "Youth develops where youth builds" are used in 4-H forestry club work.

R. A. TURNER, *Extension Service.*

**F**RUIT and Nut Production Depends Greatly on Amount of Foliage the Trees Carry The leaves of fruit and nut trees are essentially the factories in which the products that go to build the fruits or nuts are manufactured. Leaves are often spoken of as the lungs of the plant. While the leaves of plants do perform functions somewhat similar to those performed by lungs in animals, they do much more than this. They are really analogous to the digestive tract as well, for in the leaves the raw materials from the soil and from the air are built into the products that go into the fruit or nut and the woody tissues of the plant. These products, consisting of sugars, starches, acids, protein materials, and many other compounds, are either formed directly in the leaves or built in the fruit from the materials supplied by the leaves.

Thus it will be seen that the foliage of the plant is of tremendous importance from the standpoint of fruit and nut production. Within limits, the amount of fruit that a tree can carry through to maturity depends very largely upon the amount of foliage that it carries and whether or not conditions are right for the functioning of the foliage.

During recent years a great deal of work has been done to determine as accurately as possible the amount of foliage necessary to build certain fruits. With apples and pears, for example, it has been found that where only 10 well-developed leaves are present for each fruit

on the tree, the fruit at the end of the season is smaller than the best commercial size, is generally poorly colored, and is likely to be poor in flavor. With 20 large leaves per fruit, apples and pears of fair commercial size are usually produced. With a crop of this size on the tree, however, the fruit uses for its development so nearly all of the materials formed in the leaves that most varieties are likely to produce a poor crop the year following. With 30 or 40 leaves per fruit present throughout the tree, fruit of better commercial size and better quality is obtained. Trees carrying this amount of foliage in proportion to the fruit crop are also in better condition to produce a crop the following year.

### Factors Affecting Leaf Area

The amount of foliage that a tree carries is largely determined by the amount of growth that the tree makes. In the deciduous fruits the leaves are all produced on new growth, on either spurs or shoots, and the amount of leaf area is directly proportional to the amount of growth made. Thus a spur on an apple tree which grows 1 inch per year will carry a larger number and a larger size of leaves than a spur making only one-quarter of an inch of growth per year. Similarly, the longer shoots carry more leaves than the shorter shoots. Consequently, the best way to obtain increased foliage in the trees is to stimulate the growth conditions.

After the leaves are formed it is necessary to protect them from insect pests and diseases to prevent their being eaten away or their premature dropping. Any condition that results in defoliation of the trees before the fruit ripens will result in fruit of small size, poor color, and poor quality being produced during the year that the defoliation occurs. Defoliation is also likely to be followed by a crop failure during the following year. Any decrease in the number of leaves is likely to result in a corresponding decrease in the function of the tree.

### Factors Affecting Leaf Function

Many factors influence the function of the leaves, but a few are of outstanding importance from the standpoint of the orchardist. Leaves function to build food supplies only when exposed to light. A reasonable amount of sunshine seems to be very desirable to obtain fruit of best size and quality.

Of tremendous importance, from the standpoint of leaf function, is the moisture supply available to the tree. Under conditions of severe drought the leaves apparently function to only a very limited extent in building food materials; consequently, under these conditions the fruit ceases to grow. In the case of nuts, if the drought comes early, before the shell has hardened, the nuts are likely to be small. Shells of nuts usually harden in midsummer, so that the size of the nut is largely determined by conditions existing during the first half of the growing season. If a drought occurs late in the season nuts are likely to be almost normal in size, but will be poorly filled, owing to the absence of leaf function during the period when filling occurs.

There is some evidence that leaves that are well supplied with nitrogen and other essential elements from the soil, so that they are of rich green color, function more effectively than leaves of similar area that are poorly supplied with nitrogen or other essential elements.

A shortage of nitrogen in the tree also results in decreased growth and leaf area.

There is also evidence that leaf function is at least partially correlated with the amount of crop on the tree. With a heavy crop the leaves present will function slightly more efficiently than with a light crop; consequently the greatest total weight of fruit per tree is usually obtained when there is a relatively large amount of fruit per unit of leaf area. However, the individual fruits under these conditions will be small and generally poorer in quality.

In order to obtain maximum production in fruits and nuts, therefore, it is necessary first of all that the growth conditions in the trees be such that a large leaf area per tree will be developed. This leaf area must then be protected from diseases and insects to enable it to function through the season. Moisture supply is of primary importance in maintaining leaf function. Maximum production apparently is dependent upon a large foliage area functioning at the maximum throughout the whole of the growing season.

J. R. MAGNESS, *Bureau of Plant Industry.*

**F**RUIT and Vegetable Depots Facilitate Distribution in Big City Markets The commercial production of fresh fruits and vegetables has increased tremendously during recent years. Modern means of refrigeration and transportation have made possible their distribution over long distances and to all markets. Specialized producing areas have been developed in many sections of the country, from which constant supplies of a great variety of products are available throughout the entire year. Total car-lot shipments of fruits and vegetables have increased about 50 per cent during the last decade, and now amount to around 1,050,000 cars annually. As a result of this greater use of fruits and vegetables in the American diet, and the growth of city populations, there has been an immense increase in the amounts of these products handled each day through the markets of metropolitan areas. These highly perishable commodities must be distributed to retailers within a very brief time if their quality and freshness are to be retained. Many of the wholesale produce districts have become so overcrowded and congested, however, as seriously to hamper rapid and effective distribution. (Fig. 66 )

To meet the needs for expansion and improved marketing facilities, transportation companies have in recent years constructed special depots in some of the large eastern markets for the exclusive handling of fruits and vegetables. These depots, or produce terminals, consist essentially of immense covered platforms, on which car-lot receipts are unloaded and sold. They have been built in connection with large railroad yards and team tracks, and usually are so located as to be readily accessible with a minimum of traffic congestion.

These terminals consist of one or more buildings, each with a floor space ranging in size from several hundred to 1,000 feet in length and approximately 75 to 125 feet in width. Railroad tracks extend along the sides, and the terminal floors are level with the doors of freight or refrigerator cars, so that unloading may be done with floor trucks. The railroad tracks are set in concrete paving and when the cars are

moved out, wagons and trucks can be backed up against the platforms for loading. Sliding or folding doors all along the sides completely inclose the buildings during cold or stormy weather, and heat is provided during the winter. Some terminals are constructed with a full second floor the entire length of the building, furnishing office space for members of the local produce trade, while in others there is only sufficient upstairs space to provide auction rooms and offices for the railroad and terminal officials. Extensive cold-storage plants have also been built in conjunction with a few of these terminals.



FIGURE 66—Interior view of a typical produce depot, with fruits and vegetables displayed for sale. Sliding doors along each side may be raised or lowered as desired

### Produce Sold on Terminal Floors

In the cities where such facilities have been provided, most of the fruits and vegetables received in car lots are unloaded and sold on these terminal floors, with the exception of watermelons, which are sold direct from the cars on adjoining team tracks. In some instances cars are not completely unloaded on the floor, but a small number of packages are displayed and sales are made from these samples. Daily offerings range from 40 or 50 cars to as high as several hundred, depending upon the season and the particular market. Unloading is done during the night by employees of the terminal or transportation company, who transfer the contents of each car to designated locations marked on the depot floor. The various containers in each load are sorted according to marks, sizes, etc., and stacked in piles or rows, with a number of packages opened for display.

Sales are made either privately or by auction. The products which are to be sold at auction are displayed on a separate part of the floor, for the inspection of the buyers. Auction catalogue sheets are printed, listing in detail the number of each brand, size, or grade contained in each lot, and the auction sales are conducted in another part of the building on the basis of these catalogue descriptions. Citrus and deciduous fruit auctions are held in the rooms overhead, but for a few commodities such as cantaloupes and tomatoes an auction is frequently held on the main floor, with a portable stand for the auctioneer. (Fig. 67.)

Private selling is limited to certain hours, usually in the early morning. As the time approaches for the opening of trading, everything is made ready for the day's business. Salesmen check their goods and complete their displays, and at the designated hour the buyers are admitted to the floor. The products are readily accessible for inspection, and quality, condition, size, and other factors of each lot may be readily determined. A great din arises, with hurrying feet, voices raised to shouts, and a great rattle of floor trucks as transactions are completed and purchases loaded into the waiting trucks and wagon for delivery. To the uninitiated, pandemonium seems to reign, but actually there is a high degree of order and system, and the day's business progresses at a rapid rate.



FIGURE 67 — Exterior view of a fruit and vegetable depot after the day's sales have been made. Note railroad tracks where cars are spotted during the night for unloading.

Where there is more than one building or sales floor, fruits are usually displayed and sold on one, and vegetables on another. There may also be further subdivisions of the fruits, such as between cantaloupes, deciduous fruits and citrus fruits, and on the vegetable floor between the more highly perishables such as tomatoes and lettuce, and the semiperishable potatoes and onions. Successive hours of trading are often established for each group of commodities, to enable the buyers to devote their attention to each in turn. Semiperishable products may be held over on the floor from day to day, and some terminals permit unsold goods to be reloaded into refrigerator cars. In most cases, however, the more highly perishables are either sold on the day offered, or are removed to other storages.

#### Transportation Companies Provide the Facilities

The produce terminals so described are constructed by the transportation companies and serve essentially as depots for the unloading and delivery of fruits and vegetables, with the added privilege to the

receivers of conducting an organized market while the goods are temporarily held on the depot floor. Such terminals have been built in Philadelphia, Baltimore, Boston, Pittsburgh, and Detroit, and the same facilities are provided on the produce piers at New York City, although these have minor differences in construction and arrangement.

In some cities there has been a concentration of store facilities for wholesale produce dealers into continuous structures of uniform design, and many of these are also called produce terminals. There are, however, no general platforms or sales sheds provided for the unloading, display, and sale of goods received. In many cases these stores do not have adjoining rail trackage, and the commodities to be sold must either be hauled from the cars on near-by team tracks, or delivered to purchasers direct from the cars. Examples of large terminals of this type are to be found in Cleveland, Chicago, Buffalo, and Los Angeles. Smaller structures of similar character are located in several other cities.

WENDELL CALHOUN, *Bureau of Agricultural Economics.*

**G**IPSY and Brown-Tail Moth      The gipsy moth was brought to  
Infestations Are Checked      the United States and acciden-  
by Imported Parasites      tally established in Medford,  
Mass., in 1868 or 1869. The

brown-tail moth, another foreign pest, was first found in Somerville, Mass., in 1897. The caterpillars of both moths eat the leaves of various forest, shade, and orchard trees and, when abundant, completely defoliate such trees. Each pest requires a year to complete its life cycle and during this time it passes through four stages—egg, caterpillar or larva, pupa, and adult or moth.

Between 1891 and 1900, when funds were made available by the Massachusetts General Court, satisfactory progress was made in reducing the numbers of the pests in the relatively small infested area, by using various hand methods to kill the eggs, larvæ, and pupæ. Unfortunately continued appropriations were not considered necessary from 1900 to 1905, and during this period the moths increased to such an extent, and spread over such a large territory, that hopes of exterminating them could hardly be entertained. In view of this situation it was realized that any method that offered possibilities in the way of control should be given a trial. Accordingly, in 1905 the Massachusetts General Court and the Congress of the United States appropriated money to be used in studying and importing into New England natural enemies that attack these pests in foreign countries. Except for the period between 1914 and 1922, this project has been continued, the Federal Government having had complete charge since 1911.

#### Importations Mostly From Europe

For the most part the importations have come from European countries, but northern Africa and Japan have also been visited by members of the Bureau of Entomology and some material has been received from these regions. Great precautions have been exercised at all times to avoid the introduction of insects which might prove harmful.

Of the beneficial insects that have been imported, 11 of the established species have demonstrated their usefulness by reasonable multiplication and control results.

A beetle, *Calosoma sycophanta* L., which in both its larval and adult stages feeds on gipsy-moth caterpillars, and in its larval stages on the pupæ of the moth, was first liberated in New England in 1906. It is known to be one of the most important enemies of the gipsy moth. Both the larvæ and adults are able to climb up the trunks and branches of rough-barked trees and thus to reach their prey.

Five parasitic wasps have been established. Two are minute forms that deposit their eggs within the gipsy-moth eggs, and these their larvæ destroy. One, *Anastatus disparis* Ruschka, was first released in 1908 and is more important than the other, *Ooencyrtus kucanæ* Howard, which was liberated during the following year. Field collections of gipsy-moth egg clusters have been made in which over 40 per cent of the eggs were killed by *Anastatus*. Of three other parasitic wasps, one, *Apanteles melanoscelus* Ratz., was first colonized in 1911. Its larva is an internal parasite of the gipsy-moth caterpillar. The other two species, *A. lacteicolor* Vier. and *Meteorus versicolor* Wesm., kill brown-tail moth caterpillars in the same manner. While *A. melanoscelus* and *A. lacteicolor* are important parasites of gipsy and brown-tail moth caterpillars, respectively, their value is unfortunately lowered because they in turn are rather generally attacked by other parasitic insects. *M. versicolor* does not appear to be a parasite of prime importance.

Four important parasitic flies have also been established. Their larvæ feed within the caterpillars and kill them. *Comptosia concinnata* Meig. was first liberated in 1906 and, besides being of special value as an enemy of both the gipsy and brown-tail moths, is also known to parasitize the larvæ of about 125 leaf-eating insects native to North America, and to have spread well beyond the area where the moths occur. *Sturmia scutellata* R. D., first released in 1907, is a valuable aid in holding the gipsy moth in check. Its habits are interesting in that the female fly deposits her eggs on the leaves upon which the caterpillars feed, and it is in this way that they become parasitized—the eggs hatching after being swallowed by the caterpillars. The two other flies, *Sturmia nidicola* Towns. and *Carcelia laxifrons* Vill., are both parasites of the brown-tail moth, the former being of considerably more importance.

### Host Insects Have Spread

Although the first colonies of these beneficial insects were placed in the field about 25 years ago, it has required a number of years for them to increase and disperse and to attain their natural relation to the fauna of the region. During the same time the host insects have spread from the comparatively limited area occupied in 1905 until they are now found in the greater part of New England. At first the brown-tail moth, because of the flight of the adult moths, spread more rapidly and even reached the Canadian Provinces toward the north-east, whereas the gipsy moth, from a small area near the coast, has moved inland in all directions. The insect enemies have followed, although less rapidly than their hosts, and are now generally distributed throughout the infested region.

Since 1911 annual examinations of the developmental stages of the gipsy moth have been made at a series of observation points scattered over the area infested at the time, in order to determine the intensity

of infestation and the degree of parasitism. Similar observations on the brown-tail moth have been conducted since 1920. The results of these studies have shown a rapid building up of the colonized insects, beginning in 1912, and, from time to time in different parts of the area, fluctuations in abundance which have accompanied the fluctuations of the hosts. Innumerable other, but less systematic, observations during the whole period since the gipsy and brown-tail moths came to this country have emphasized the continual fluctuations in abundance of these insects. Figure 68 represents graphically the tendency of the annual fluctuations in abundance of the two host insects and of their imported natural enemies, based upon systematic observations within the limited area mentioned above.

Figure 68 indicates that the gipsy-moth infestation, which had already reached a high level in 1912, remained so until 1921, when it began to decline rapidly and reached the lowest level in 1924, again in-

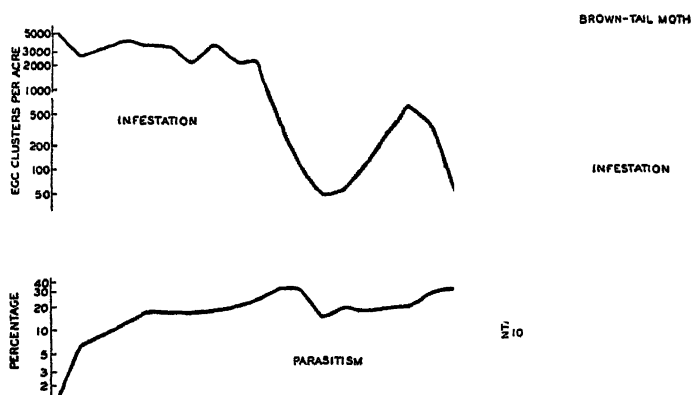


FIG. 68.—Fluctuations in degree of infestation and degree of parasitism of gipsy and brown tail moths in New England. "Egg clusters per acre" based on estimates made in special observation points. "Thousands of webs per town" refers to number of webs, in which caterpillars spend the winter, removed from trees and destroyed by State and town employees in towns considered

creasing in intensity until 1928 and falling off once more in the following two years. The corresponding curve of parasitism shows a general increase from 1912 to 1930, most rapid in the beginning, but maintained throughout the period except for the temporary falling off in 1924, when the infestation was at the lowest point. It is noticeable that the increase in parasitism continued (until 1923) beyond the point (1921) where the infestation began to decline.

Figure 68 also shows the general progress of infestation and parasitism of the brown-tail moth since 1920. Throughout this period the infestation has in general been at a very much lower level than it was between 1905 and 1920. It continued to decline until 1925, when it again began to increase. During this decade the fluctuations of parasitism have been more irregular than those of the gipsy moth. It is nevertheless seen that as the infestation was declining from 1920 to 1925 parasitism was in general increasing, and there is at least a suggestion in the curves that the two tendencies have approached a balance in the remainder of the period.

## Intensity of Infestation

It is notable that since the establishment of the parasites the intensity of infestation of neither gipsy nor brown-tail moth has reached the high level attained in the earlier years, whereas the curve of parasitism has shown a general upward tendency.

Two of the imported parasites have been unexpectedly helpful beyond the immediate field for which they were intended. It has already been mentioned that *Compsilura concinnata* has become a valuable enemy of other destructive insects occurring in New England and neighboring areas. This fly has proved to be an efficient enemy of the satin moth, which is an introduced pest first found in New England in 1920. The same is true of a small parasitic wasp, *Eupteromalus nidulans* Thom., which was first imported from Europe as an enemy of the brown-tail moth, but which has never proved of appreciable value for its control in this country. These two introduced species are, as far as is known, the only important insect enemies of the satin moth in New England.

C. W. COLLINS and T. H. JONES, *Bureau of Entomology.*

**GIPSY-MOTH Eradication Project in New Jersey Apparently Successful** In July, 1920, the New Jersey Department of Agriculture reported the finding of a severe gipsy-moth infestation on a large estate near Somerville in that State. Investigation showed that this was by far the worst outbreak of this insect that had ever been found in the United States outside of New England. The female moths were depositing eggs on many of the tree trunks and the undersides of branches were so thickly covered with egg masses that the bark was almost completely obscured. Steps were immediately taken by the United States Department of Agriculture to determine the area infested and to apply treatment measures. The estate, which covered about 2,000 acres and was provided with 25 miles of roads and drives, was immediately closed to the public and the removal of trees and shrubbery was prohibited.

The worst part of the infestation centered in a 30-acre area of Koster spruce, several acres of which were completely defoliated. These trees had been imported from the Netherlands and other European countries in 1911, before the passage of the plant quarantine act regulating shipments of plants and plant products from abroad, and the insect was brought to this country in that way.

It was determined at the outset that the work should be directed by the Federal authorities and that the Federal Government and the State should finance the project jointly. A hurried survey made during July and August resulted in the discovery of many colonies of the insect over approximately 100 square miles of territory centering around Somerville, but a more detailed examination during the months that followed indicated that it had spread over more than 400 square miles. The seriousness of the problem was increased as a result of finding the insect well established in the Wachung ridges which extend in a series of wooded ranges across the northern part of the State, and because 318 shipments of trees from the infested estate had been forwarded to

72 towns in the State, and 216 lots had been shipped to 17 other States. These shipments were traced and small infestations were found in Pennsylvania and New York as well as in nine scattered localities in New Jersey. Treatment measures were applied to all of these small isolated infested locations and the insect was exterminated during the following two years. (Fig. 69.)

In November, 1920, the State legislature appropriated \$112,000 for conducting the work, \$25,000 was contributed by the owner of the estate, and on March 3, 1921, Congress appropriated \$225,000 for gipsy-moth work in New Jersey. Intense scouting and clean-up work was carried on during the fall and winter. It included cutting and burning large areas of badly infested trees and brush. Equipment was purchased and assembled so that upward of 20 high-power spraying machines were available for operation in the worst infested part of the

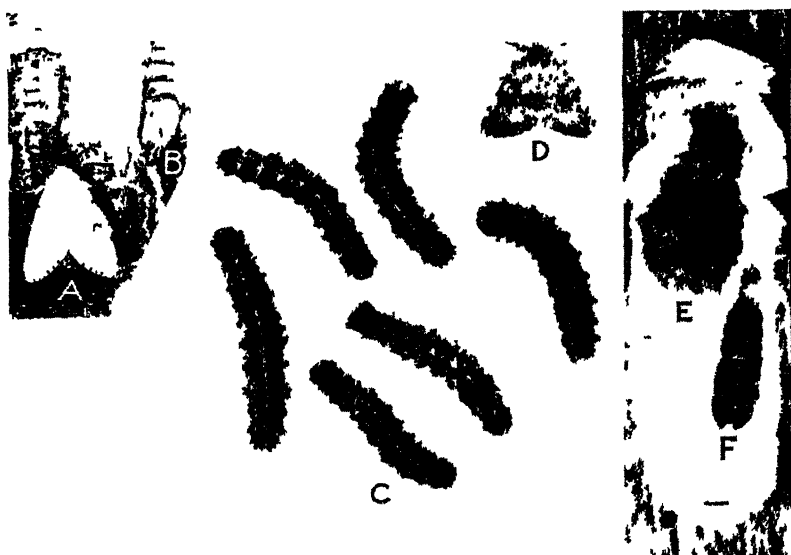


FIGURE 69.—Life stages of the gipsy moth. A, Female moth; B and F, pupae; C, larvae or caterpillars; D, male moth; E, egg mass. All about three-fourths natural size.

territory early the following spring. Over 3,000,000 egg clusters were treated during the fall and winter and thousands of acres of tree growth were sprayed, more than 100 tons of arsenate of lead being used.

The movement of nursery stock and other materials likely to carry infestation was regulated by a State quarantine which was enforced by the Federal organization acting under State authority. As a result of the first season's work no trees have since been defoliated by the gipsy moth in the State of New Jersey.

#### Eradication Task Undertaken

The problem of exterminating the insect, however, was more far-reaching and difficult than that of obtaining sufficient control to prevent obvious damage to vegetation. The habits of this insect were well known, the injury caused by it was a matter of record in the New England States, and the extreme difficulty of eradication after the pest

had become well established over a wide area was fully appreciated. Nevertheless the opportunity was offered to exterminate it over a large and difficult area. This opportunity was accepted by the Government and the State of New Jersey with the purpose of ridding the State of the pest and incidentally of eliminating the possibility of spread from this source throughout the adjoining States and to distant parts of the United States.

The plan of operation after the abundance of the insect had been materially decreased in the central part of the infested area was to rotate the work in different sections of the territory. An area was thoroughly scouted by experienced men, the egg clusters destroyed by an application of creosote, the center of the colony and surroundings sprayed with arsenate of lead in the spring after the normal time for hatching of the caterpillars, and the results checked up by expert men. The use of these methods for a single year does not give positive assurance that eradication has been secured when areas of country as large as a township are concerned and where the growth is varied and the terrain is irregular. After a lapse of intensive work in such an area for a season or two, it must be very carefully reexamined, sometimes more than once, in order to be sure that the result aimed at has been accomplished.

#### Various Methods Necessary

No set formula can be given for conducting an operation of this sort, as the methods used must be based on the conditions and on the nature of the tree growth in different sections of the territory. While wholesale cutting and burning of infested growth in some wild lands is the cheapest and most effective method that can be used, in residential sections or in areas where the tree growth is highly prized for shade or landscape effect, it is entirely impracticable, and more expensive methods such as treating egg clusters and spraying are necessary. The usual type of orchard sprayer is inadequate to meet the conditions of this work. Higher pressures are necessary to force the spray material through hose lines sometimes a mile in length. This is frequently required in heavily wooded areas. Special equipment such as hose that will withstand 1,000 pounds working pressure and specially designed couplings and nozzles must be used in order to effectively spray tall trees from the ground without climbing. Heavy truck sprayers can not be moved far from well-maintained roads and should be set up at the water supply in order to prevent the necessity of hauling water for the spray solution. (Fig. 70.)

Particular attention must be paid to the eradication of infestations along streams or watercourses in order that the egg clusters of the insect may not be spread to other localities on floating debris. In several instances it was necessary to mount spraying machines on small scows so that the trees along the edges of rivers might be sprayed when they could not be reached on account of swamps or flooded areas. This is only a single instance illustrating the ingenuity shown by the workers in the field in surmounting difficulties that arise in certain parts of the territory.

After the known infested area and the colonies in the outlying sections had been given careful attention, scouting was taken up in a belt of townships approximately 10 miles wide, beyond those where infestation had previously been found. This was necessary in order to make

sure that there were no outlying colonies, and increased the area in New Jersey requiring careful scouting to more than 2,300 square miles. Each year since this outer belt of townships was scouted the plan has been to gradually close in toward the center. In this way the territory has been gradually reduced and the expenditures decreased accordingly.

The largest expenditure made during the progress of this work was in 1923, when \$295,000 of joint State and Federal funds were used.

#### Last Live Moth Found in 1929

The last live gipsy moth was found in New Jersey in June, 1929, but considerable work has been required in reinspecting territory in the central part of the area. This is a tedious and expensive operation. Not only is excellent eyesight necessary on the part of the men employed but a system of checking the work that has been covered is essential to prevent colonies of the insect from being overlooked. Dur-



FIGURE 70 —Spraying woodland in New Jersey. The spray is being applied to trees in the background more than 2,000 feet from sprayer in the right foreground.

ing the last three seasons traps baited with a material that will attract male gipsy moths have been used throughout the greater portion of the area that was once generally infested in order to secure additional evidence as to the presence of this pest, but no moths have been caught.

Since the work began in New Jersey there has been expended on this project over \$2,200,000. It is estimated that the cost of carrying through the reinspection work during the next year will be approximately \$40,000, after which time, if no new infestations are found, a small amount of checking work should be done for a few years in the localities which are most likely to be infested, as a precautionary measure. (Fig. 71.)

The New Jersey gipsy-moth project covers the largest area where an attempt has been made to exterminate rather than to control this insect. Excellent cooperation has existed between the Federal and State organizations. This has been supplemented by sympathetic interest on the part of the citizens living in the infested territory. This attitude is particularly commendable when it is realized that in many cases the insect occurred in such small numbers that no visible damage could

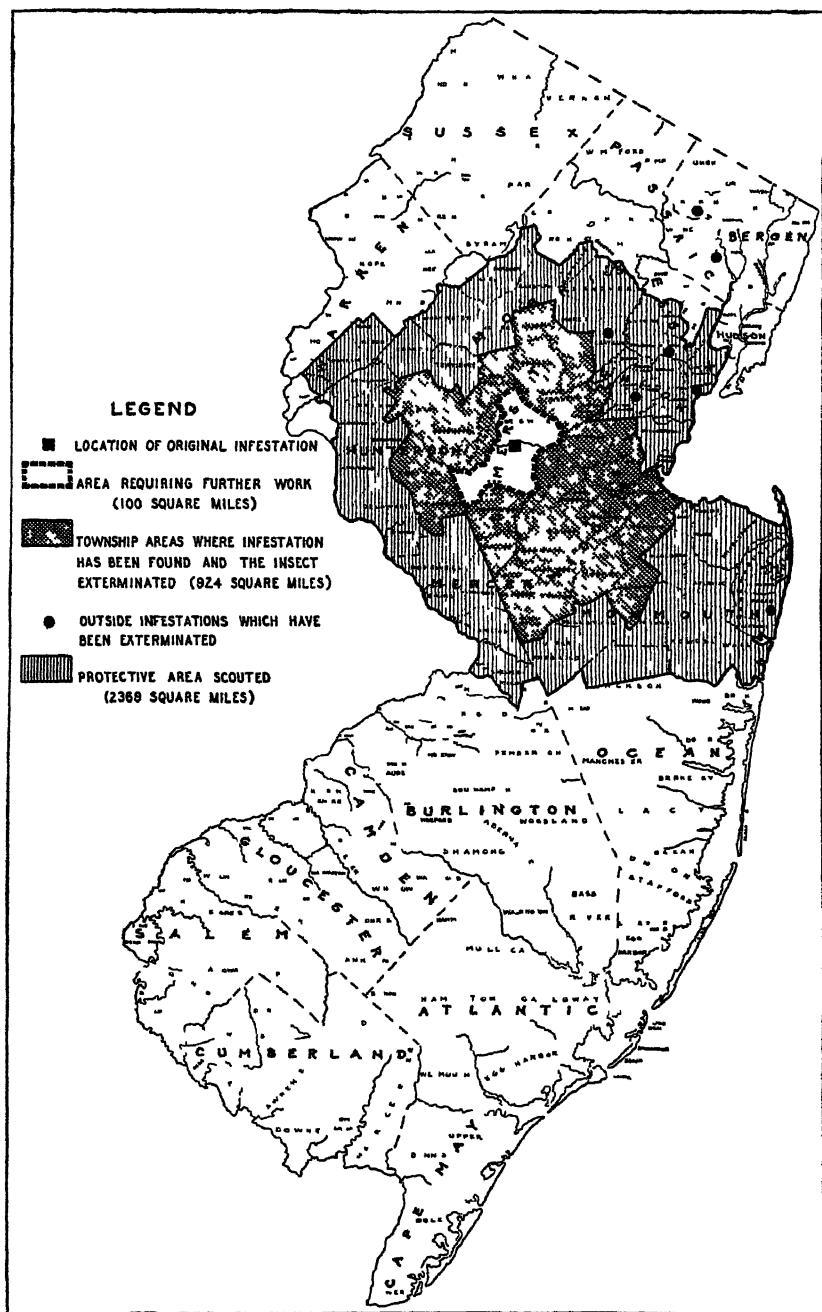


FIGURE 71.—Status of gypsy moth eradication project in New Jersey, April 15, 1931

be observed and that it was necessary to cause the owners serious inconvenience in order that exterminative measures might be applied to their property.

A. F. BURGESS,  
*Plant Quarantine and Control Administration.*

**H**OME Accounting Makes Good Headway Among Farm Women Rural home makers throughout the United States who have been keeping household accounts in cooperation with the Extension Service of the United States Department of Agriculture, report that household accounts tell them: (1) Where the money is going; (2) how much the farm is furnishing toward family living; (3) how to plan future expenditures that will bring more satisfaction to the family; (4) how to establish habits of thrift with the children; (5) how to divide the money wisely according to the many family needs; (6) how to adjust family disputes that arise in relation to money matters; (7) how to buy wisely and use the money intelligently; (8) the total amount of money spent for family living; (9) how to maintain desirable living standards through changing economic conditions.

In a number of States farm men and women have been meeting together for 2-day conferences to discuss the farm and home economic conditions of their counties and communities and to make recommendations as to better ways of farming and home making, based on their years of experience and on information which the extension agents are able to provide. During these discussions the men and women have analyzed the cost of living on the farm for the average family of five members. The analysis included the details of how much cash is required to provide the food supply; how much money is needed for clothing; the amount to be allowed for fuel, light, operating expenses of the home, and replacement of furnishings; what should be set aside for education, recreation, and community activities; and such items as personal needs and gifts. A comment made most frequently by the rural women taking part in these discussions was that they did not know how much money the family was using. In consequence, in every State the women have asked the extension agents to assist them in keeping household accounts.

The usual procedure has been to enroll in a study group the home makers who had become interested in household-account keeping. Many of these women were wives of farmers who were keeping farm accounts, and thus at the end of the year the totals for family living and farm expenditures could be analyzed and changes in management practices for both the farm and the home for the next year could be plotted. In other cases the interest of the wife in household accounts led her husband to start farm accounts.

The Extension Service sometimes furnished the household account book free or at a nominal cost. Often the women used a notebook and ruled columns, putting in the headings for the expenditures, or obtained the account book from banks or other commercial agencies.

#### Value of Accounting Recognized

At the first meeting of the study group the women discussed with the extension agent the method of entering the various items of expenditure, and simple ways and means of keeping accounts, such as a wall

board on which the monthly sheet was thumb tacked, a pencil tied to a string, and a spindle to hold bills were fastened. At subsequent meetings the account keepers discussed the purchasing of clothing, the value of the garden products as a contribution toward the family living, the high cost of entertaining, the need of wise expenditure of funds for upkeep of the house and furnishings, how to obtain the cooperation of the family in keeping accounts, and how to teach boys and girls money management. At the end of the year the group met to make an analysis of their total expenditures. In some cases the Extension Service staff, or research workers of the land-grant colleges, gave assistance in making the analysis and helping to draw conclusions. The consensus of the women was that their accounts had been so valuable that they would not consider discontinuing them.

The comments made by household-account keepers, taken from the extension agents' reports, tell vividly the value they found in account keeping:

A mother and father who were looking forward to giving their children a college education said that they never would have been able to save the money if they had not kept accounts and worked out their budget in advance.

One home maker said, "You know, I thought I wasn't spending any money this year, and here my total money expenditure is higher than that of any other home maker in our group."

Many human interest stories tell of complete changes in the management of the home as a result of account keeping. An especially interesting story is that of a family in which the husband had had several operations and the family had become burdened with debt until they were almost hopeless. By keeping accounts they found that they were doing too much entertaining, and too much of the work, including food production, that could be done in the home, was being done outside. After keeping accounts for only a few months they were able to adjust matters so that they expected to clear their debt by the end of the year.

### Influence on Health Habits

Account keeping often affects health habits, as is illustrated by this story. One woman stated that when her two little girls were born, while she was living in the city, it was necessary to purchase milk. In order to economize, the youngsters were denied an adequate supply, and in their teens these girls had trouble with their teeth. Later, the family moved to a farm, and two little boys were born. These youngsters had plenty of milk and have always had good teeth. The mother said that she realizes now that she might have saved much of the dental expense for the girls had she purchased milk for them while they were growing.

Another woman states that even though she is very busy and does not have money to spend on luxuries, she finds it worth while to keep a strict account so as to make the pennies go as far as possible. By keeping accounts she was able to improve her whole house.

Another woman comments that the greatest value she received from keeping accounts was that they enabled her to be sure that her income was being used to the best advantage. She also reported that the suggested budgets did not suit her needs. In order to reach her goal, of having her income sufficient to enable her to live as she had been

accustomed if the income stopped, she changed the percentage for savings given in the suggestive budgets to a much higher one.

It is difficult to estimate the value of keeping accounts from the point of view of changed attitudes and habits of living, but extension agents report that rural people feel that knowing how much money the farm is earning, and how that money is being spent, gives them a basis of comparison with the cost of living in the city, and makes many of them decide to remain on the farm. Accounts also furnish home makers with fact information that is not merely hearsay or a panacea. They prove that raising vegetables for home use is profitable in many instances, and that certain practices relating to buying materials for the home are economical. What is still more important is that keeping accounts and having family councils on money matters have made for happier family relationships.

Very few rural women have yet come to the place where they are willing to pay for the services of a trained person to assist them in household account keeping. The farm-management specialists report that farmers to-day are willing to pay as high as \$25 a year for the assistance of a trained worker in farm account keeping. Perhaps the day will come when rural home makers will be willing to pay for a service of this kind, since it is fundamental in getting the most from the money earned by following the profession of farming.

MARY ROKAHR, *Extension Service.*

## HOME-DEMONSTRATION Agents Assist in Developing Farm Family Resources

Despite hard times and greatly reduced cash incomes, thousands of farm homes became better places in which to live during 1931. Early in the year many families realized that filled pantry shelves and storage bins, supplemented with all-year gardens, would be the best insurance against hunger and want during the winter. Consequently, extension agents emphasized the value of year-round gardens, fall gardens, the utilization of practical irrigation systems, hotbeds and coldframes, and the introduction of new kinds and varieties of vegetables, berries, and small fruits. Planting of improved home gardens was encouraged in many localities by establishing a demonstration garden, which showed what to plant, when to plant, how to cultivate, and how to take care of a continuous succession of growing crops.

In Arkansas, for example, home-demonstration agents visited 100,000 gardens in 1931. Of these 2,500 were demonstration gardens. Approximately 4,260 gardens on Arkansas plantations were supervised by Negro extension agents. Nearly 40,000,000 quarts of fruits and vegetables and other home-grown products were canned in 56 counties employing home-demonstration agents, and 45,592 farm families marketed \$1,114,802 worth of surplus garden, poultry, and home-dairy products. In November and December, 1931, 6,399 beef-canning demonstrations were made by home agents in Arkansas. Nearly 42,500 families had fall gardens.

In promoting the live-at-home program, Texas farm and home demonstration agents helped to increase farm home gardens 45 per cent in 1931 over the previous year, to more than treble the amount of canning, and to extend the home production of meat to 75 per cent of the farms. About 50,000,000 cans and jars were filled with

vegetables. More than 64,500 farm families provided a home supply of meat by canning. (Fig. 72.)

A food plan or budget for a farm family of five for one year, outlined by Texas home-demonstration agents, called for the production of \$547 worth of food on the farm and the purchase of but \$63 worth. The home production and conservation program called for a sufficient supply and variety of foods, including pork, beef, lamb, chicken, dairy products, vegetables, fruits, and cereals. The agents encouraged farm women and girls working under their direction to standardize surpluses and offer them for sale.

Farm home products were marketed more extensively during 1931 than ever before. While some of the money returns may appear small, the cash received in many cases covered one or more important family needs. It paid the mortgage interest; bought the schoolbooks and clothes; clothed the family for the year; paid the year's grocery bill; bought labor-saving equipment for kitchen, or laundry, or home dairy, or poultry work; painted the house; improved the living room; or kept a boy or girl in college. No other way of taking care of some of these items could have been provided.

In Garfield County, Okla., total sales in one farm women's market amounted to \$14,225. In Arkansas 22 market-gardening



FIGURE 27.—A Texas farm woman with her home-preserved food supply. In 112 counties in Texas 256,217 farm families provided part or all of the year's food supply from canned vegetables, fruit, and other farm products

demonstrations were conducted. Several roadside markets made a substantial contribution to the live-at-home campaign.

Thirty-nine home-demonstration markets in North Carolina sold \$236,517 worth of products through club markets, carload shipments, and individuals. In South Carolina total sales as a result of home-demonstration marketing work amounted to \$293,738. Eighteen club markets in Alabama reported sales of \$347,652.

Farm women in Texas counties pooled their homemade rugs to fill an order placed by the manager of a large department store in Dallas for 100 hooked wool rugs. Their quality carefully protected by home-demonstration standards, a wide variety of products is sold privately in stores and in special markets by women and girls in Texas under the distinctive Better 4-H Products label.

The money with which to pay for needed household equipment or furnishings has often been supplied through the sales of farm home products from gardens and orchards, poultry flocks, and home dairies. The records also show that many other things have been sold, such as homemade rugs, canned goods, baskets, tooled-leather articles, quilts, gloves, and many other special homemade products.

Recognizing that convenience, comfort, and beauty in the home, well-kept grounds, appropriate clothing, and wholesome recreation are essential, agents encouraged farm families to strive to attain these ends in practical and economical ways. More farm women in Texas enrolled as demonstrators to improve their living rooms in 1931 than in 1930 and greater interest was shown by the club girls in improving their bedrooms. Some of the women have exchanged quilts for rugs, canned goods for furniture, and so on. Often keen family interest in home improvement has led to the exchange of field labor for labor in painting the house, in paper hanging, or in installing plumbing.

Much resourcefulness and ability are shown in the use of shrubbery in beautifying home grounds. Satisfying improvements have been accomplished by work involving little or no cash outlay.

There has been more organized group activity in community improvement, road and highway beautification, and wholesome recreation.

OLA POWELL MALCOLM, *Extension Service.*

**H**OME-DEMONSTRATION Work Influences Farm the United States now have county  
**Women, Survey Shows** home-demonstration agents who work with the farm women on problems closely associated with the home. In a large proportion of the remaining counties considerable work with farm women is done by the county agricultural agents with the assistance of the home-economics specialists from the State colleges.

During 1930 extension agents reached 646,000 women through formal groups organized for study purposes. In addition, many women were reached individually by extension workers, and much information was passed on to neighbors by local leaders and others affiliated with the various home-demonstration clubs or home-bureau groups, as they are variously called in the different sections of the country.

In order to obtain reliable information on whether extension teaching actually is causing farm women to take up improved methods of home making, personal interviews with all the farm women in representative areas of 16 States have been held. In 12 of the States home-demonstration agents have been employed in the counties involved in the studies for an average of six years. In two of the States the counties studied had had the services of a district home-demonstration agent serving from three to four counties, while in the remaining States the only home-economics extension conducted outside of emergency work, during the war period, was handled by the agricultural agents, with the assistance of State home-economics specialists.

According to the information supplied by the women themselves, new or better practices have been accepted as part of the regular home procedure in 32 per cent of all the farm homes in the areas studied. The percentages of homes reporting changes due to extension teaching ranged from 7 per cent to 65 per cent. The number of changed practices reported varied from 12 to 177 per 100 homes. The changes most frequently reported related to clothing and to food preservation. Other changes reported with great frequency dealt with food preparation and the nutritional technic of feeding the family.

As these four lines of work are equally applicable to homes of owners and tenants, it was not surprising to find that approximately the same percentages of each have been influenced by extension.

### Size of the Farm a Factor

The size of the farm apparently has some bearing upon the adoption of better home practices, the percentages of homes influenced being a little higher on the larger farms.

The distance from the county extension office, and whether the home was situated on an improved or an unimproved road, had little if any bearing upon the adoption of home-economics practices.

In six areas where information on educational training of farm women was obtained it was found that a definite relationship existed between the amount of formal schooling received and the extent to which home-economics practices were changed.

On the other hand, age of farm women seemed to have little bearing upon the adoption of new or better practices, the older women reporting practices changed about as frequently as the younger women.

By far the most important factor affecting the adoption of practices was contact with extension workers. Where farm women had attended home-demonstration meetings or had otherwise come into personal contact with the home-demonstration agent or State specialist, six times as high a percentage reported practices adopted as was true among women making no such contact. More than twelve times as many changes per 100 homes were also reported for the contact group as for the noncontact group.

In order to get the most out of extension work farm women should belong to the local home-demonstration club, attend extension meetings, and in other ways inform the extension workers of their interest and individual problems.

Home-demonstration workers must assume the responsibility of stimulating interest and influencing the women outside of home-demonstration clubs, by means of bulletins, circular letters, personal visits, news stories, and similar means and agencies.

M. C. WILSON, *Extension Service.*

## **H**ONEY Grading Stamps Give Consumer Full Confidence in Product

In the United States there are found honeys of many distinct flavors, each flavor determined by the variety of flower from which the bees gathered the nectar. In certain regions where farms are large it is not uncommon to find hundreds of acres of a single variety of nectar-producing forage plant. The white-clover belt in the central northern part of the United States produces white-clover honey in large quantities. In the Intermountain States, Nebraska, and the Dakotas, alfalfa and sweetclover furnish enormous crops of honey. The honey in the Pacific Coast States comes largely from alfalfa, orange, sage, star thistle, and fireweed, whereas in the South tupelo, sourwood, gallberry, and cotton are the principal sources. Buckwheat honey in commercial quantities is furnished chiefly by New York and Pennsylvania.

It is only natural to expect a variation in color, flavor, and physical appearance of honeys coming from such a wide geographical range. Honeys vary in color from water white to very dark amber. There is some correlation between the color and the flavor of honey, the dark honeys usually having a more pronounced flavor than those of lighter color. Tupelo and sage honeys remain in clear liquid form almost indefinitely, whereas honeys from alfalfa and sweetclover crystallize shortly after their removal from the hive.

Honey is available in two forms—extracted and comb. Extracted honey is produced by the bees in the same manner as is comb honey

except that it is made in larger combs; the liquid honey is afterwards separated from the comb by means of a centrifuge or extractor. Extracted honey, in its liquid or in its granulated form, is sold in tin cans, pails, or glass jars. Comb honey, on the other hand, is sold in the small square sections just as it was sealed by the bees. (Fig. 73.)

#### Product Merits Consumer's Confidence

As relatively few persons ever have an opportunity to familiarize themselves with beekeeping, the great majority have no conception of the manner in which honey is produced commercially. They therefore look upon all honey with suspicion, whereas, so far as genuineness and purity are concerned, there is probably no



FIGURE 73—It's all good honey

food product on the market in which the consumer may place greater confidence. In the first place, adulteration of honey is not a profitable undertaking and, therefore, has never presented a problem to State and Federal pure-food officials. Although the pure-food law prohibiting the shipment from one State to another of impure or adulterated honey as pure honey has been rigidly enforced, less than a dozen instances of misbranded or adulterated honeys have been found by Federal inspectors since the passage of the law in 1906. In the second place, the only difference between the commercial

honey of to-day and the bee-tree honey of yesterday, in which some persons still have such faith, is in the matter of cleanliness. Bee-keepers have gone a long way toward perfecting clean methods of handling honey, but they have not changed the product of the bee.

Recently the Department of Agriculture, by recommending and putting into official use the United States grades for honey, has taken still another step to insure the consumer access not only to genuine honey, but to the best honey. These grades cover every form of honey produced and the fundamental principle underlying them all is that the honey must be of good edible quality. For example, between the two grades of extracted honey designated as Fancy and No. 1, practically the only difference is that the latter may have air bubbles and small particles of wax which are not permitted in the former. In the grades of comb honey the difference is largely a matter of color and evenness of cappings and the completeness with which the bees have filled all the cells of a section, although in all grades sections are sold by weight. (Fig. 74.)

The employment of the United States grades by producers of honey carries with it the privilege of using Government grading stamps, which offer a medium for describing the many commercial honeys

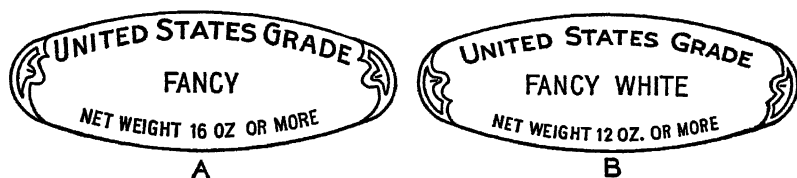


FIGURE 74.—Grading stamps A, Extracted honey, B, comb honey

produced in this country. As the consumer learns what these grading stamps signify, he discovers that it is possible to obtain exactly the color and quality of honey which he desires. By bringing about a better understanding on the part of the consumer, the United States grades for honey not only facilitate sales, but they also give the consumer greater confidence in this most wholesome of sweets.

GEORGE E. MARVIN, *Bureau of Entomology.*

## **I**NBREEDING Experiments with Guinea Pigs Are a Guide in Stock Breeding

“Never practice close inbreeding if you want vigorous and prolific livestock,” is advice often heard among farmers. There is also a common belief that the stock will run out and that they will lose size and be more subject to disease. These results have been experienced by many farmers who have inbred their stock extensively.

In the endeavor to obtain more definite information on the effects of inbreeding than general observation has furnished, the Bureau of Animal Industry planned an experiment that has been conducted continuously for the last 25 years. The purpose was to determine the effects of close inbreeding when carried on for successive generations. Guinea pigs were selected as the experimental animals because an extensive experiment of this nature with the various classes of livestock would be too expensive and would require too much time. In

general the results obtained with guinea pigs should be similar to those likely to be obtained with larger animals.

The experiment has now extended through 30 generations of the closest possible inbreeding—that of matings between brother and sister. Data on about 25,000 animals have been recorded during the quarter century. To accomplish this same amount of work with cattle would require about 120 years, with sheep about 70 years, and with hogs 40 to 50 years.

The experiment was begun with 35 lines of guinea pigs, but 11 failed to produce a second generation and 1 line was disposed of because of a skin disease, thus leaving 23 lines in the experiment. Between 1906 and 1911 some of these 23 lines became extinct, because of weakness, and between 1911 and 1917 three or four other lines were disposed of because they could not be maintained by brother-sister matings. Only five lines continued through the 25 years. For comparison with the closely inbred lines, a control stock was established in 1911 and maintained by matings not more closely related than third cousins.

### Practical Examples in Hog Raising

At the beginning of the experiment the five lines differed in number of young per litter, birth weight and weaning weight of the young, percentage of young born alive, and percentage of those born alive which were raised to weaning. All these factors mean profit or loss to livestock producers.

Let us consider, for example, the results of the guinea-pig experiment in terms of swine. In the number of young per litter, there was a decrease of nearly 27 per cent in all the inbred lines of guinea pigs for the 25-year period. At the same decrease in swine, if sows at first produced 12 pigs to the litter, at the end of about 30 generations of inbreeding they would produce only 8 or 9 pigs to the litter. But this is assuming all are born alive. After 30 generations of inbreeding it was found that there was a decrease of over 20 per cent in the number born alive. Accordingly, the number of live pigs would be only 6 or 7, and of these, only 4 or 5 would reach maturity and be marketable. Certainly there would be no profit in this. It is true that all the five lines of guinea pigs did not have so great a decrease in litter size or so great a mortality. Some breeds of hogs might suffer more or others less from the practice of close inbreeding, but, in general, it would not be a safe procedure for the average farmer to follow.

Swine breeders usually aim to produce spring and fall litters. Guinea pigs normally breed every 69 days, a frequency which makes possible 5 litters during the year. Inbreeding reduced fertility to such an extent that instead of 5 litters, only 3 litters a year were produced on the average by the inbred stock. In hog production this loss would not be so great as with guinea pigs, but it might delay breeding to such an extent that in some years production of 2 litters would not be possible.

For the last 15 years of the experiment, records were kept of matings which proved to be completely sterile. During this time nearly 10 per cent of the matings never produced a litter. It is true that the fertility of the stock at the beginning of the experiment was not known, but 10 per cent sterility seems large and with any class of livestock would be a serious loss.

### Signs of Progressive Weakness in Inbred Stock

Mortality losses in these studies included young dying just before or at birth and those dying between birth and weaning. The first group is known among stockmen as stillbirths. This type of mortality is probably an indication of weakened constitution or some physiological disorder in the dam, a condition which interferes with the birth of living young. In the guinea-pig experiment the number of stillbirths increased as inbreeding progressed. The number of young dying between birth and weaning also increased as inbreeding progressed, a fact which probably indicates weakness in the young as well as in the dam.

The mortality of the mature guinea pigs was also taken into consideration. The death rate of females was much greater than that of males during the reproductive period of the females, but there was considerable difference in female mortality among the five inbred lines. Two lines had a very heavy death rate at the birth of the first or second litter. In two other lines the female produced three or four litters and then died. In the fifth inbred line the females had a greater length of life than those in the noninbred stock. If there are such differences in breeds of livestock, it would certainly be advisable for the farmer to select strains of known long life for his breeding stock.

Weight apparently was influenced less by inbreeding than by the factors just discussed. In most of the lines there was a lower birth weight and weaning weight than in the foundation stock and early generations, but some lines showed a gain. In every case the percentage of change in birth weight during the 25-year period was much less than the percentage of changes in fertility and mortality. Gains between birth and weaning, however, dropped about 33 per cent. In every case the weaning weights at the end of the 25-year period were less than those at the beginning of the period and averaged nearly 25 per cent less. Let us consider these results also in terms of swine. Even though inbred pigs at birth might weigh the same as those not inbred, the gain up to a certain age would be 130 pounds instead of 200 pounds. Thus the farmer would have to feed his pigs for a longer period in the effort to bring them to a desired market weight. The same would hold true for beef steers and market lambs.

### Control Stock Also Declines, Though More Slowly

All the foregoing facts make a bad case for inbreeding, but comparisons with the noninbred stock indicates that other factors may have been responsible for some of the decline experienced. In 1911, when observations on the noninbred stock were begun, there was very little apparent difference between it and the inbred lines. The noninbred stock, however, has shown declines similar to those of the inbred stock in nearly every respect except that they have been at a less rapid rate. Apparently the control stock is more nearly maintaining its vigor. Change in size of litter has been about equal in both inbred and noninbred stocks. The increase in mortality among the inbreds has been about twice as fast as in the noninbreds. In weight at birth and weaning, the noninbred line made a gain during the 25-year period, but the gain at weaning was much lower than the gain in birth weight because of lower percentage gains.

## Many Interesting Variations Observed

This condition complicates matters and makes one wonder whether the damage attributed to inbreeding really was due to such inbreeding itself or to other causes. As a matter of fact, inbreeding and certain other causes, which we may call environmental, are probably operating together to give the results obtained. Some of the evidence to show that inbreeding does play a large part in the decline of the guinea-pig stock lies in the fact that the noninbred lines did not decline at so rapid a rate as the inbred. Another may be in the fact that there is only one-third as much sterility in the noninbred stock as in the inbred lines.

Still further proof may be in the difference among the various inbred lines in their response to inbreeding. The five inbred lines differed from one another under the same conditions of feed and management. If these conditions alone were responsible for the decline in the various factors mentioned, one could reasonably expect a similar percentage decline in all lines, and that all would maintain their same relative ranking in fertility, mortality, and weight. This is not the case, however. The line which produced the smallest litters in 1906 produced the largest in 1930, and the one which produced the largest in 1906 had fallen to second place in 1930. The greatest decrease in litter size was almost 37 per cent, whereas the smallest was only 3 per cent. The line with the highest mortality at birth at the beginning of the experiment has become next to the lowest in this respect but has suffered the greatest loss in birth weight and weaning weight of its young. The three lines with the lowest mortality at birth in 1906 had the highest mortality in 1930.

These and many other similar results bring out the point that inbreeding has intensified and fixed certain hereditary differences in size and frequency of litter, rate of gain, mature weight, and mortality. The hereditary basis for such differences is very complex and only by intensive inbreeding is it possible to establish true breeding strains. There is added difficulty, however, in combining all the desirable characteristics in one line. For instance, the line with the greatest fertility and longest life has the disadvantage of low weight. Also the line producing the heaviest young has the disadvantage of high death rate. Thus, frequently when several characters are concerned the good points are counterbalanced by undesirable ones. These undesirable characters are intensified by inbreeding just as are the good ones. Thus it is distinctly advisable for the breeder to use only superior individuals if he breeds closely. Inbreeding may be a valuable instrument for remedying defects, but as in surgery it should be guided by an experienced and expert hand.

O. N. EATON, *Bureau of Animal Industry.*

## JAPANESE Beetle Has Found Conditions in Eastern States Ideal

Fifteen years have now elapsed since the Japanese beetle was first discovered in the United States. Observation and experience have shown unmistakably that the beetle has found conditions, in the eastern portion of the country at least, ideally suited for its rapid multiplication; favored host plants in abundance; and an almost total lack of parasites, native to this new environment, able to hinder its development to any marked extent.

## Distribution in the United States

The influence of modern agencies of transportation and commodity distribution upon the dispersion of an insect is well illustrated by the dispersal of the Japanese beetle. All available data support the belief that the beetle, although a vigorous flyer, is exceedingly erratic in its flight and its average rate of natural dispersion is not normally in excess of about 5 miles a year. However, a much more rapid distribution is inevitable and has actually occurred as a result of present-day transportation methods. The approximate distances from the original point

of infestation (Riverton, N. J.) to the most distant points where beetles were found during the summer of 1931 are, to the north (Little Falls, N. Y.), about 220 miles; to the east (Boston, Mass.), about 270 miles; to the south (Charleston, S. C.), about 575 miles; and to the west (Columbus, Ohio), about 430 miles. That the distribution has not been much more widespread may properly be credited to the enforcement of Federal and State quarantine restrictions on the movement of various carriers and products.

The area of distribution at the close of the 1931 beetle season may be roughly divided as follows (fig. 75): A

zone of continuous infestation, which comprises the southern three-fourths of New Jersey, with the exception of the lower one-half of Cape May County; the southeastern counties of Pennsylvania, adjoining the city of Philadelphia, as far west as Quakertown, Pottstown, Coatesville, and Kennett Square; and the extreme northeastern corner of Delaware as far south as the vicinity of Delaware City. Beyond this area, a zone of discontinuous or localized infestation, the outer limits of which are indicated by such localities as Boston and Springfield, Mass.; Albany, Little Falls, Binghamton, Elmira, and Watkins Glen, N. Y.; Sayre, Williamsport, Lock Haven, Altoona, and Chambersburg, Pa.; Hagerstown and Brunswick, Md.; Washington, D. C.; and Alexandria and Norfolk, Va. Still far-

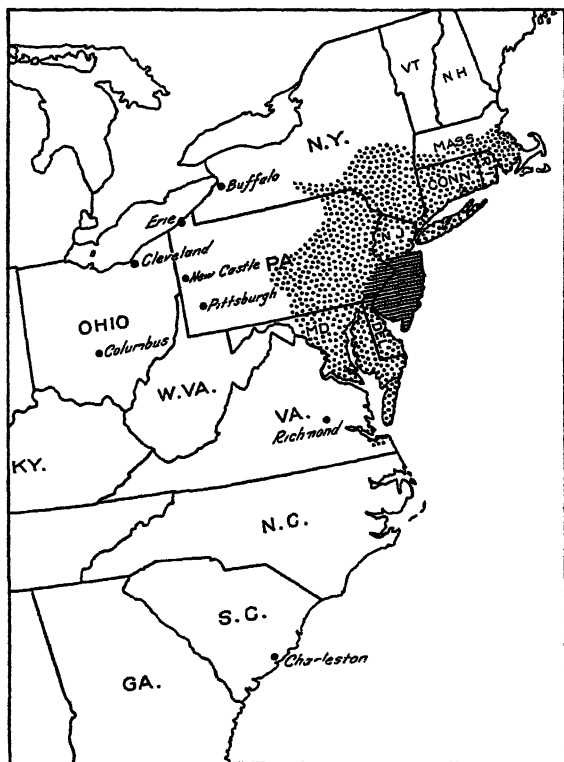


FIGURE 75.—Map showing distribution of Japanese beetle in 1931; zone of continuous infestation shown by cross lines, zone of discontinuous infestation shown by dotted area, separated points shown separately

ther out, a number of widely separated points of limited infestation, such as Buffalo, N. Y.; Erie, New Castle, and Pittsburgh, Pa.; Cleveland and Columbus, Ohio; Richmond, Va.; and Charleston, S. C.



FIGURE 76—Lighter patches indicate turf killed by Japanese-beetle grubs

vicinity, from 15,000 to 20,000 could be collected by hand by one person in a day; in 1929, on a 15-acre lawn not many miles distant, approximately 10,000,000 beetles were caught in traps in 44 days. At favored points of heavy infestation, such as in well-kept lawns or golf greens (fig. 76), an average of from 350 to 400 grubs (the larval or immature stage of the beetle) to the square yard is not infrequent.

Despite this alarming rapidity of increase, it should be borne in mind that scarcely any other part of this country offers so favorable a combination of environmental conditions of temperature, rainfall, soil types, and host plants as is found in the present zone of continuous infestation. The insect, being a native of Japan, is evidently adapted to an insular rainfall. These conditions are in general most nearly approxi-

mated on our eastern seaboard, whereas farther inland, where prolonged summer droughts are of rather frequent occurrence, as well as extremes of heat and cold, the climate would appear to be less favor-

### Population Density

An outstanding factor in the situation has been the amazing reproductive capacity of the insect under favorable environmental conditions. When the Japanese beetle was first discovered in August, 1916, only a very few beetles could be found; three years later, in the same immediate



FIGURE 77—Defoliation of apple tree by feeding of Japanese beetles

able. There is evidence that the Japanese beetle is adversely affected by droughts, especially if these come at a time when eggs are being laid and hatched. Furthermore, data at hand seem to indicate that the maximum-infestation peak in a given locality may remain at the high level for only a relatively few seasons, and be followed thereafter by a noticeable decline to a lower level of abundance and destructiveness.

### Host-Plant Groups

Observations over a period of years have shown that, while the Japanese beetle will feed upon more than 250 species of plants, the preferred food plants number only from 35 to 40. The fruit trees most subject to attack are the apple, quince, peach, cherry, and plum. (Figs. 77 and 78.) Not only is the foliage attacked but the fruits as well, especially of the early ripening



FIGURE 78 —Japanese beetles clustered on ripening peaches

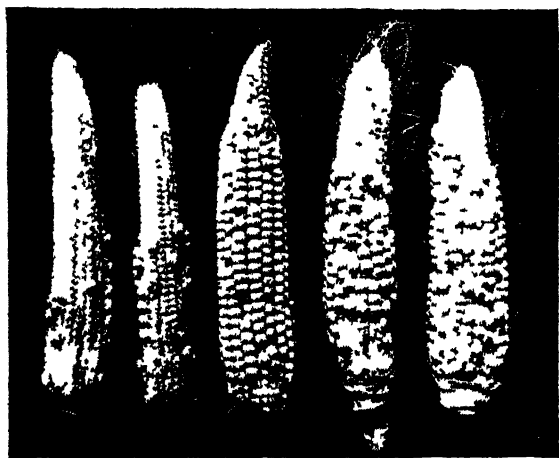


FIGURE 79 —Typical imperfect pollination of corn resulting from Japanese beetle feeding on silk

varieties. The pear is an outstanding exception, both foliage and fruit apparently being almost entirely immune to beetle attack. Among the plants bearing small fruit, the grape, raspberry, and blackberry are most subject to attack, especially the grape; the fruits of these varieties, however, are rarely, if ever, eaten by the beetle.

Truck crops are seldom seriously injured by the beetles, though in restricted areas of exceptionally heavy

concentration beetle damage to foliage or blossoms of rhubarb, peas, beans, and similar garden crops may at times be quite severe. Sweet corn is a noteworthy exception to this rule; the foliage suffers but

little in most instances, but the green silk is very attractive to the beetles and is fed upon extensively, the result being to prevent, or to seriously interfere with, the pollination of the ear. (Fig. 79) In commercial plantings the reduction in recent years in marketable ears as a result of this feeding has run as high as 100 per cent.

In recent years it has been found that the grubs at times feed rather extensively on the roots of various truck crops. Appreciable damage to the roots of such crops has frequently been observed even when the crops were growing in well-cultivated plots or fields. Examples of plants suffering such damage are strawberry, sweetpotato, beet, eggplant, tomato, and carrot.

Among field crops, beetle feeding of any consequence is limited to corn, soybean, and red clover. Injury to field corn has been increasingly observable in recent years, particularly in parts of eastern Penn-



FIGURE 80.—Characteristic skeletonizing of foliage by Japanese beetles

sylvania; this crop frequently suffers in the same way and nearly to the same extent as sweet corn. Severe injury to soybean has also been noted in a number of instances.

In the group comprising ornamental trees and plants, shade trees are favored food plants of the beetles. The varieties most commonly attacked are sassafras, linden, elm, horsechestnut, Lombardy poplar, and willow. Conifers are practically immune, with the exception of larch and bald cypress, which are frequently almost completely stripped. Forests, however, can be considered as completely immune to beetle attack. Many ornamental flowering shrubs and plants, including shrub althea, rose, hollyhock, butterfly bush, evening-primrose, dahlia, phlox, and aster, are generally and regularly attacked. Foliage injury is quite consistently typical; defoliation is not immediate, but the leaves are first skeletonized, then turn brown, and are soon shed. (Fig. 80) Flowers are riddled by the beetles feeding on and perforating the petals.

It is generally believed that the eggs of the Japanese beetle are for the most part deposited in grassy areas, and seldom in cultivated ground. However, there have been observed a number of instances of severe grub injury to the roots of some varieties of nursery stock growing in well-cultivated plots in commercial nurseries (fig. 81), the varieties affected include azalea, rhododendron, arborvitæ, and hemlock. The injury is due not so much to grubs feeding on the rootlets as to the girdling of the main root at a depth of from  $\frac{1}{2}$  to  $1\frac{1}{2}$  inches below the surface of the ground. Even when girdling is not complete, the partial injury to the top of the plant, making it unsalable, is equivalent to a total loss from the standpoint of the commercial grower.

### Parasites

In spite of the fact that the beetle has been abundant in the central area of infestation for more than 10 years, and while some species of the native white grubs or June beetles present in limited numbers in this area are attacked by native parasites to some extent, there is little evidence so far that these parasites have attacked, or are likely to attack, the Japanese beetle in either its adult or larval stage.

Of the 15 species of foreign parasites of the beetle which have been introduced into New Jersey from time to time since this work was started in 1921, 5 species have become established within the area generally infested by the Japanese beetle. These parasites belong to two general orders or groups of insects, the Diptera or fly group and the Hymenoptera or wasp group. The parasite species of the former group do not find conditions quite so favorable for their development as do the latter; they apparently require a somewhat more northern habitat, where the life cycle of the beetle will conform more closely to the requirements of the parasite. However, the two species of parasitic wasps of the latter group give considerable promise, and numerous colonies have been liberated throughout the area of heavy beetle infestation.

### Artificial Control Measures

Reasonably adequate control measures have been developed to protect foliage from the Japanese beetle.



FIGURE 81—Girdling of stem of nursery plant (indicated by arrow) caused by Japanese beetle larvae

suitable sprays of stomach poisons or contact insecticides. Likewise, quite satisfactory methods have been devised for the "grub-proofing" of lawns and golf courses. (Fig. 82.) Several methods have been

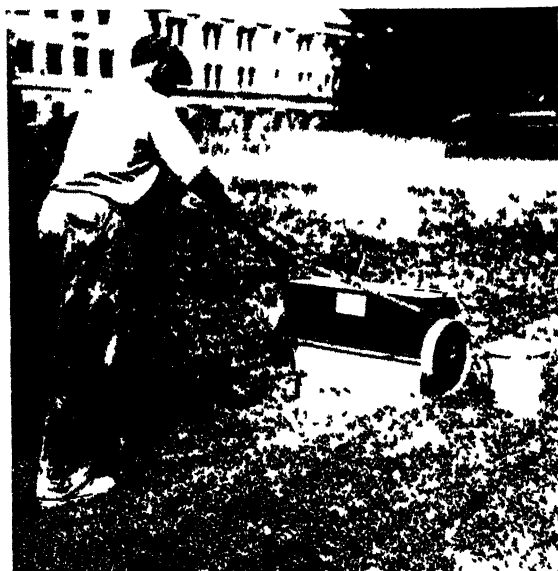


FIGURE 82—Applying lead arsenate mixture for "grub-proofing" turf

developed for handling or treating most of the types of nursery stock grown in the infested area, so that they may be shipped in compliance with quarantine requirements without risk of further dispersing the beetle. Measures have been perfected for treating or otherwise handling those farm, garden, or orchard products likely to carry infestation. A trap capable of catching large numbers of beetles has been developed, using as a bait a mixture containing oil of geraniol, which was found to be especially attractive

to the beetle. Constant effort is being made both to improve those methods of treatment already devised and to develop new and better measures.

C. H. HADLEY, *Bureau of Entomology.*

## LAMB Becomes More Tender When Ripened By Period of Storage

Ripening meat consists in hanging the fresh, chilled carcasses or cuts in cold storage for a period of days or weeks. Temperatures are held at about 36° F., and the relative humidity is kept fairly low so that the surface of the meat will remain dry. Consumers of beef long ago decided that ripening increases its tenderness and improves its flavor. As a result a considerable quantity of commercial beef is held in cold storage for from two to six weeks before delivery to the retail stores whose trade desires this ripened meat. Ribs, loins, and hind quarters of high-grade, well-fattened cattle are best adapted to ripening or aging.

Pork consumers, on the other hand, have indicated a definite preference for chops, loin roasts, and fresh hams that have not been ripened.

These market preferences for ripened beef and freshly chilled pork are in contrast with the lamb situation, in which no definite choice exists. Lamb is moved into the retail trade as promptly as possible to prevent a storage shrink in weight, but normally neither premium nor discount is made because of the length of that storage period. The few customers who desire their chops as soon as the carcass has been chilled about offset the few who ask that a hind quarter be "hung back" for ripening.

In connection with the meat-research program conducted by the Bureaus of Animal Industry, Home Economics, and Agricultural Economics, of the Department of Agriculture, together with 26 State agricultural experiment stations and several other livestock and meat agencies, legs from several hundred lambs have been roasted annually in recent years and tested for tenderness, flavor, and other factors of palatability. Some of these legs were cooked and sampled within two days after the lambs were slaughtered. Others, forced to wait their turn in the cooking laboratory, were held in cold storage for varying periods up to 25 days.

### Large Quantity of Data Summarized

The palatability records of 1,222 of these legs have been summarized to study the effect of ripening upon the tenderness of the meat. Comparisons were made to see whether the consumer would obtain a more desirable product from lamb that was freshly chilled or from lamb that had been ripened for a definite length of time.

The 1,222 legs used in this summary came from 1,222 different lambs. In contrast to subsequent tests, described later, of pairs of legs, the selection of the legs in this part of the experiment was on a strictly random basis. Almost every age, breed, grade, and feeding method were represented and groups of the legs were cooked after varying periods of storage, as shown in the graphs. The number of lambs is so large that the summary of their tenderness records should show the effect of ripening upon the eating quality of the meat in spite of variations due to other causes.

All these 1,222 legs of lamb were cooked and sampled under as nearly the same conditions as could be maintained, according to the directions given in the project outline of cooperative meat investigations. Every leg was roasted skin side down and cut flesh side up in an open pan on a rack, without seasoning, without added water, and with the fell left on. Every leg was seared for 20 minutes in a very hot oven averaging about 510° F. (265° C.) then finished very slowly at 257° F. (125° C.), until a meat thermometer kept in the thick portion of the leg reached 169° F. (76° C.). Each was carved while hot.

A committee of four or five experienced judges ate slices from the inside muscle of the leg (semimembranosus) for the purpose of describing its aroma, flavor, juiciness, and tenderness. The judges used the cooked-meat grading chart adopted for the cooperative meat investigations project. After thoroughly chewing the meat, each judge graded its tenderness by one of the following word descriptions: Extremely tough, very tough, tough, slightly tough, moderately tender, tender, very tender. These word descriptions are a means of placing each leg of lamb on a 7-point scale of tenderness between the extremes of tenderness and toughness. Slightly tough may be looked upon as a mid-point, or average, of the total range between extremely tough and very tender. For convenience in averaging the tenderness grades given to a leg of lamb by several judges, numbers from 1 to 7 have been arbitrarily assigned to the word descriptions. By this system each leg of lamb receives a numerical measure of tenderness, or score, which is the average of the opinions of several judges.

## Mechanical as Well as Chewing Test Used

In addition to the chewing test as a measure of tenderness, there was also a mechanical test. Samples taken from the inside and outside muscles of the leg (semimembranosus and biceps femoris, respectively) were tested for resistance to shearing by a specially designed instrument which registered in pounds the force required to shear through the meat sample. For brevity, the observation was recorded as "shearing strength." Low tenderness scores given by the judges are associated with high resistance to shearing and high tenderness scores are associated with low resistance to shearing.

The tenderness records of the 1,222 lamb legs were averaged in groups for each day for from 2 to 10 days after slaughter, and thereafter for 5-day intervals. The data for judges' scores and shearing strength are

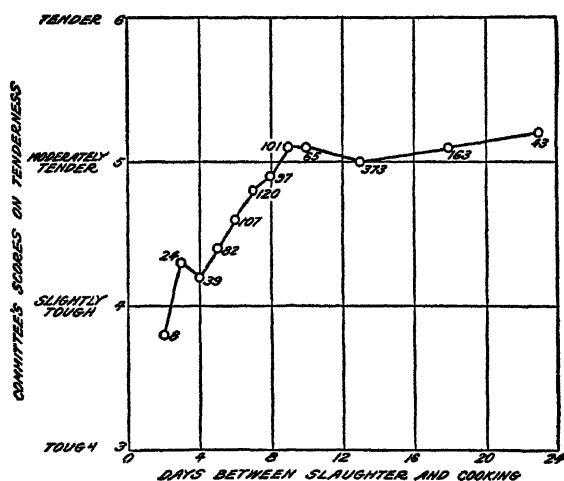


FIGURE 83.—Effect of ripening on tenderness of 1,222 cooked lamb legs, as determined by judges' scores. Figures at points on curve show number of lambs tested.

shown graphically in Figures 83 and 84. During the first 10 days of storage the meat increased in tenderness on the average from slightly tough to moderately tender, or over one grade, as indicated by the judges' scores. After 10 days the meat continued to be moderately tender, with slight fluctuations up and down. This same general trend was recorded by the mechanical test.

Since the methods of grading and testing meat for tenderness used in these lamb

studies were new, additional tests were made to check these methods and to determine whether they would accurately compare the variations in palatability. Forty-eight pairs of legs of lamb were used in such tests. Corresponding lefts and rights from the same carcasses were cooked and tested on the same day to see whether the committee and the tenderness machine could give comparable reports on meat that was similar. The results both by judges and by mechanical tests revealed no significant difference between the average tenderness of the 48 left legs and that of the corresponding 48 right legs. Not only were averages similar but variations for one particular leg were also observed in the committee gradings and tenderness test of its mate.

## Methods of Testing Found to be Reliable

In view of these results it appeared that the methods used were showing the differences in the meat and that, on the average, ripening actually did improve the tenderness of lamb as shown by the preceding summary of the 1,222 legs.

To check this still further a special experiment was conducted in which the left legs from 60 lambs were cooked and tested within 2 to 6 days after slaughter and the corresponding right legs were held 12 to 21 days after slaughter before being cooked and tested by the same method. The data made possible a study of effects produced by ripening periods of different lengths for the same kind of meat. Of 60 legs stored for the longer periods, only 3 were less tender than their mates stored for shorter periods and these differences were small. The results obtained confirm those indicated by the 1,222 individual samples, shown in Figures 83 and 84.

The combined results show that, on the average, lamb legs become more tender if held in cold storage for from 7 to 10 days after slaughter. Tenderness changes but slightly during the next 10 days, and the mechanical test showed a small decrease in tenderness beyond 20 days of ripening.

Of special interest is the fact that the meat from individual lambs ripened the same number of days varied widely as to tenderness. From the group of 1,222 left legs of lamb and the 60 pairs of legs, of those stored for 3 days, the meat ranged from very tough to tender; for 10 days it ranged from tough to very tender, and for the 16 to 20 day interval from slightly tough to tender. These individual ranges serve to explain why the average differences in tenderness resulting from storage for varying intervals are not greater than they appear in Figures 83 and 84.

Of special concern to lamb producers is the observation that "green" meat from some lambs was tender and fully ripened meat from others was not. In other words, some of the lambs possessed a natural tenderness that was lacking in the others. There seems to be a real opportunity for the lamb industry to improve its product by research that would discover and develop the blood lines and management methods that produce the more desirable product.

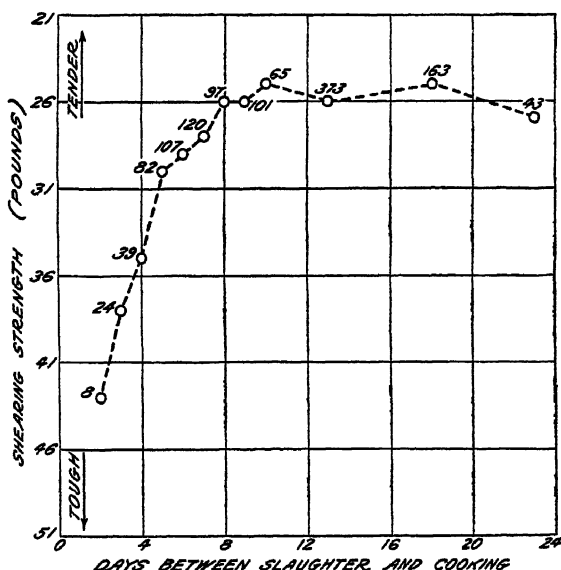


FIGURE 84 — Effect of ripening on tenderness of 1,222 cooked lamb legs, as determined by mechanical test. Figures at points on curve show number of lambs tested.

K. F. WARNER, *Bureau of Animal Industry.*

LUCY M. ALEXANDER,

*Bureau of Home Economics and Bureau of Animal Industry.*

## LAMB Grading at Point of Origin Compensates Producer for Quality

With the growth and development of agricultural extension and educational facilities, the wide distribution of economic and market information, and the cooperative movement, a greater appreciation of quality in agricultural commodities and products has developed among the farmers throughout the United States. Until a few years ago (and in many States and communities even at the present time), it was a common practice among sheep raisers to sell their lambs at the farm for a flat price per head or per hundredweight. This system of selling presumes that all lambs in a flock are quite similar in such characteristics as conformation, finish, and quality and should therefore sell for the same price.

The realization among sheepmen that all lambs have not the same characteristics has been largely responsible for the development of a system of marketing whereby lambs are assembled in the country at a concentration or shipping point and sorted into grades having similar characteristics, then sold upon this basis either at the concentration point or after being shipped to a central livestock market. This system of marketing does not suppose that graded bands of lambs will net more money than they would if a buyer were to pay a flat rate per hundredweight for the same band of lambs. If sold according to grade there would be a wide range between the price paid for the lambs of high grade and that paid for those of low grade. If, however, they were sold at a flat price per hundredweight, the price received would be between that paid for high and low grade lambs, depending upon the buyer's estimate of each grade represented in the band of lambs. Should this band of lambs belong to one producer, the importance of grading might not be so great. However, in the farm-flock States, producers do not have lambs in sufficient numbers to make individual shipments to market. It is necessary that several producers pool their market lambs in order to effect economies in shipping expenses.

In pooling lambs for shipment it is obvious that lambs from different flocks are not similar in such characteristics as conformation, finish, and quality. Lambs from the same flock differ in these respects. Yet, the producer marketing Choice grade lambs receives the same price as the producer marketing Medium grade lambs, under the flat price per hundredweight method of buying and selling. This method of dealing violates the principle of selling lambs on their merit, since it causes high-grade lambs to sell below the prices that could be obtained if they were sold separately from the lower grades, and it destroys much of the incentive to produce lambs of superior quality. Under a system of marketing by which the lambs are graded at the point of origin these inequalities in price are avoided.

Marketing lambs by grade has been practiced rather extensively for several years in Missouri, Kentucky, and Tennessee. The enthusiasm of sheep producers for this method of marketing, and its growth, are the best evidence that it is sound and practical. Grading lambs at country assembly points has a great many educational features that are proving beneficial. It enables producers to learn the standards for the different grades of lambs. It clearly demonstrates that breeding, feeding, and management are factors involved in producing the highest grades of lambs. It creates a desire among sheepmen to produce better lambs because of the higher price which they command, and finally it provides ample proof that a painstaking shepherd is well rewarded for his efforts.

M. T. FOSTER, *Bureau of Agricultural Economics.*

**LESSER Peach Borer Killed with Paradichlorobenzene Dissolved in Cottonseed Oil** The lesser peach borer has been regarded as an important peach insect for at least 25 years, and during recent years it has caused much damage to some peach orchards. The insect has a decided preference for peach trees, which are its favored hosts, although other known food plants are plums and cherries (both cultivated and wild), the black-knot fungus on plum and cherry, Juneberry, beach plum, and chestnut.

This borer invariably works in areas on the trunks or limbs of peach trees that have been injured by implements, harness chains, low temperatures, cankers, or sun scald, and in crotches or under loose bark of old trees. Frequently it is found working around a pruning wound which has failed to heal properly. Orchards that have been somewhat neglected or those in which there are injured or diseased trees are the most subject to attack. Injury is due to the destruction of the cambium and inner-bark layers by the feeding of the larvæ, and usually a considerable quantity of gum is found exuding from infested areas. In severe cases limbs may be entirely girdled and killed, or the trunk may be honeycombed by the work of the larvæ, and in practically all cases the trees are weakened. Injury is confined largely to old trees, since the larvæ apparently prefer to work in areas where the bark has been injured in various ways, and at old crotches.

Frequently the lesser peach borer has been confused with a somewhat larger species known simply as the peach borer. This confusion is not surprising, for the two insects are closely related and are much alike in both the larval and adult stages. They are two entirely distinct pests, however, and work in different parts of the tree, the lesser borer confining its attack to the limbs and upper trunk whereas the larger borer attacks the trunk at and below the soil level and is sometimes found working in the large roots.

#### Former Method of Control

The use of paradichlorobenzene crystals is now a well-established means of controlling the peach borer, but the only control hitherto for the lesser peach borer has been to cut the larvæ out of their burrows with a knife. Hand worming is unsatisfactory, and since the trees are seldom killed by the attacks of the lesser borer, even this measure has not been generally practiced. Consequently, heavy infestations, especially in old orchards, are not uncommon. The lack of a good method of controlling this important peach insect attracted the writer's interest in 1924. Observations and experiments were therefore started in that year and have been continued until recently when, as a result of these investigations, paradichlorobenzene dissolved in crude cottonseed oil was announced as an effective and practical remedy for the insect.

#### Method of Treatment

This new insecticide, which the Department of Agriculture is now recommending for the control of the lesser peach borer, should be used in the proportion of 1 pound of paradichlorobenzene crystals to 2 quarts of crude cottonseed oil. Oil from any southern cotton-oil mill will be satisfactory for making the insecticide. In cool weather the oil may have to be warmed before all the crystals will dissolve, and some recrystallization may take place if the insecticide is stored

during cool weather; however, the crystals will dissolve again when warm weather returns. The container should be tightly stoppered if stored, to prevent the loss of the active ingredient.

The insecticide should be applied to the infested areas with a paint brush (Fig 85) Treatment should extend for a few inches beyond



FIGURE 85—Peach trees being treated with paradichlorobenzene dissolved in cottonseed oil for control of the lesser peach borer

the edges of borer indications, and the areas should be thoroughly soaked with the insecticide. Only infested areas should be treated. The insecticide should not be used over the entire trunk or on whole limbs, or on healthy tissue at places other than on the borders of infested areas. It should be applied either in the fall or spring. Fall applications have an advantage over those made in the spring in that they kill the borers before they are full grown and prevent their working in the trees during the fall and the warm periods of the winter. On the

other hand, the results of experiments indicate that the percentage of borers killed by applications in April is a little higher than by those made in October. It is not necessary to remove the gum, frass, or loose bark from infested areas before applying the wash

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## LOGS from the Wood Lot May Be Sold Profitably on a Log-Grade Basis

Small timberland owners are at a disadvantage in selling their logs, because they usually have only a general idea of the comparative value of the different classes of logs. When a farmer delivers logs to a mill yard he frequently bases his selling price on his labor cost plus a charge for the timber, which practically ignores the value of the stumpage. His price should equal the difference between the value of the lumber produced and the production costs of the sawmill operator plus a fair profit for manufacturing.

Selling on a log-grade basis should be advantageous to both the farmer and the sawmill operator. While the inferior logs would bring very little, larger and better logs would bring considerably more. Consequently it would generally be more profitable to save smaller trees for a more profitable cut later on, or to cut smaller trees into poles, fuel, or pulpwood.

The value of logs depends not only on size but also on the amount of defect. The amount of defect has a marked influence on the amount of lumber produced, but little on its quality. Therefore no correction is necessary if the logs are sold on a net scale basis. If, however, they are sold on a gross scale basis, a percentage reduction on their value equal to the percentage of defect should be made.

One of the greatest obstacles in the way of selling logs on a grade basis is the fact that there are no standard log grades. In the absence of log grades and with the hope of partially overcoming these obstacles, the following simple quality classification for logs, based largely on the position they occupied in the tree, is offered: (1) Butt logs, (2) smooth logs, and (3) top logs. The first would include all butt logs 10 inches or larger, free from limbs or knots. The second would include all other logs 8 inches or larger that contain not more than one knot on the surface for every 4 feet in length of the log. The third would include all the other logs. They would be relatively coarse and knotty, and usually the top logs of the trees.

#### Grades Applied at a Southern Mill

The application of these grades was tried out by the Forest Products Laboratory at a southern mill cutting second-growth loblolly pine. Based on 1928 costs and values the operator could make a fair profit by paying \$14.26 for butt logs, \$7.08 for smooth logs, and \$2.50 for knotty logs per thousand board feet, Doyle scale, with 3.5 per cent deduction for defects. Based on the percentage of the different types of logs brought to the mill the flat rate would have to be \$9.71 per thousand, Doyle scale, to yield the same return to the farmer on his timber. If the farmer could dispose of his knotty logs elsewhere, the buyer could afford to pay \$10.60 for butt and smooth logs. The figures quoted should only be used as a guide, for local conditions might lower or increase these figures considerably. For example, the price of pine logs sold at the mills in Arkansas as given by United States Department of Agriculture Statistical Bulletin No. 32 gives an average price of \$10.43 with the individual sales varying from \$8 to \$18.

The spread in value indicated above between butt logs, smooth logs, and knotty logs holds fairly well in other species also. In northern red oak, for example, with a 12.5 per cent deduction for defects, butt logs are worth \$27.90, smooth logs \$18.30, and knotty logs \$12.50; and in sugar maple with a 5.3 per cent deduction for defects the butt logs are worth \$21 and the other logs about \$11.20.

Some appreciation of difference in log qualities will help the small wood-lot owner to obtain a fairer price for his timber, but he must not forget to find out before he cuts his timber what the buyer will pay, what size and length he will accept, and how defective the logs may be.

RAY MILLER, *Forest Products Laboratory.*

## MEAT Prices at Retail Follow the Trend of the Livestock Market

During 1931, when prices of all agricultural commodities were falling rapidly, the Department of Agriculture received many inquiries as to whether the lower prices received by livestock producers were being reflected in retail meat prices. In response to these many inquiries, the depart-

ment analyzed retail meat prices at New York City. The assembling of adequate and comprehensive data on retail meat prices to present a true picture of the retail market throughout the country is a difficult task, since meats vary widely in grade and are sold in various styles of cuts in thousands of stores with different kinds of customer service. This report, therefore, deals with only one grade of carcasses sold at New York by stores on a cash-and-carry basis with some delivery and credit service.

The retail meat prices were collected twice a month from the retailers and the mean of the range of the quotations as reported for each cut was computed and used as the average price for that particular retail cut. In the case of beef, prices were collected on the six more important cuts, i. e., porterhouse, sirloin, and round steaks, and rib roasts, chuck roasts, and plate beef; for lamb, prices are for the leg, loin, and rib chops and stew meat. In neither case do the above cuts comprise the entire carcass, consequently prices were calculated for the remaining cuts, i. e., flank, blade rib roast, brisket and shoulder of beef, and square chuck of lamb, by using a retail price differential more or less common to the New York retail market.

#### Method Used in the Analysis

The prices for the 10 cuts of beef were then used for computing a weighted composite retail price per pound of the total salable beef in a carcass, making allowance for the usual trimming and boning done by the retailer. Based on numerous tests in which cuts were given a fairly close trim, the salable beef represented about 79.75 per cent of the carcass weight, the remaining 20.25 per cent represented shrinkage, fat, and bone trimmings. The same procedure was followed in computing the composite retail price of lamb, and in this case, the salable portions equal 97.5 per cent of the carcass weight.

Having the composite or average retail price of cuts from a Good grade steer carcass, based upon the semimonthly and monthly retail price quotations, the total retail value of a carcass was computed. The packers have given an average dressing percentage of 58 per cent to Good grade steers; thus a 1,000-pound steer will produce a carcass weighing 580 pounds, and from this carcass the retailer will be able to sell 462.5 pounds of trimmed retail cuts. Multiplying this weight, 462.5 pounds by the composite retail price, gives the total value of the retail cuts from a 1,000-pound live steer. To determine whether or not the price reduction of the live animal is reflected in the retail prices, it is necessary to compare the total value of the live steer with the total value of the retail cuts, because the prices of some individual cuts react just the opposite to the live steer market or the wholesale meat market at certain seasons of the year. Without taking into consideration the prices of all cuts from a carcass, the retail prices of only a few cuts may be very misleading and a true condition of the retail market can not be visualized from them.

#### Basis for Steer Values

In computing the value of a 1,000-pound Good grade steer, the average monthly quotations of the Chicago market were used, whereas the value of the 580-pound Good grade steer carcass was based upon the average monthly quotations of the New York wholesale meat mar-

ket, and the retail value was based upon the composite retail price computed from the retail quotations at New York. In the case of lamb, the same procedure was used except that the carcasses were taken as 48 per cent of the live animal, thus giving 480 pounds for each 1,000 pounds live weight, and 468 pounds as the weight of the trimmed retail cuts.

The accompanying charts (figs. 86 and 87) illustrate the monthly fluctuations in the value of the live animal, carcass, and retail cuts for the years 1929 to 1931.

The average value of a live steer for 1929 was \$140.30, and for a carcass, \$125.40, whereas the retail cuts gave a gross return to the retailer of \$188.47, in comparison with returns during the first 10 months of 1931, when a steer realized \$89.80, or a reduction of \$50.50; carcasses

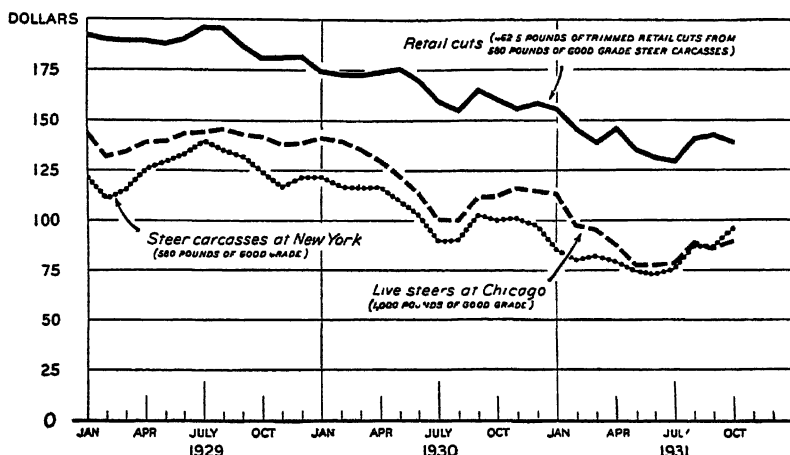


FIGURE 86—Total value of live beef steers, carcasses, and retail cuts

\$81.20 or a drop of \$44.20; and the retail cuts \$141, a decrease of \$47.47. Comparing returns in 1930 with those in 1931, steers declined \$30.20, carcasses \$24.10, and retail cuts \$25. In both cases there is evidence that the reductions that the packer allowed the retailer were passed on to the consumer. The reductions that took place on the live animal appear not to have been applied entirely to the carcass, consequently the reductions for the live animal and for the retail cuts are not comparable.

#### Margins Remain About Constant

The margins or the differences between the carcass value and retail value seem to remain about constant with some seasonal variations and a slight lag at times because of the lack of immediate changes by the retailer in reflecting the carcass changes in the retail cut value. There also appears to have been a general trend on the part of the retailer to narrow the margin during 1931 as compared with the margins the two previous years.

When considering lamb for the years 1929 and 1931, similar facts are observed. A comparison of figures for 1929 with those for 1931 shows a decrease in value of 1,000 pounds of live lamb of Good grade from \$143.60 to \$75.10, a decline of \$68.50. Carcasses of this same grade

declined from \$131.20 to \$81, or \$50.20, whereas the retail value dropped from \$182 to \$121.10, a decline of \$60.90. Thus the retailers were allowed a reduction of \$50.20 on the carcasses but lowered the value of the trimmed retail cuts by \$60.90, apparently allowing the consumers a greater saving than that to the retailers by packers. For the years 1930-31 live lambs per 1,000 pounds had a reduction of \$21.40, carcasses were reduced \$18.60 for every 480 pounds, whereas the value of the 468 pounds of retail cuts was reduced \$24.30.

The data presented here in chart form show that in general the value declines in the cattle and lamb markets in the last three years have been reflected in the wholesale meat market, although not completely so, because the value of the by-products have also been reduced and these outlets have absorbed part of the livestock value reductions.

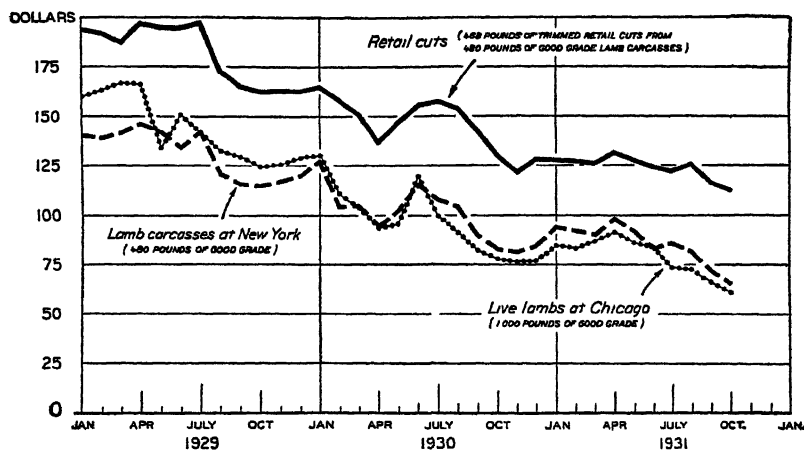


FIGURE 87—Total value of live lambs, carcasses, and retail cuts

Although there is a tendency for the retail meat values to change more slowly than the carcass values, the reductions given by the packer are eventually passed on to the meat consumer.

A. T. EDINGER, *Bureau of Agricultural Economics.*

## MEXICAN Bean Beetle Approaches Northern Limits of Distribution

Ten years after its discovery in the eastern part of the United States the Mexican bean beetle has apparently approached the northern limits of its distribution, at least from an economic standpoint. The new territory invaded during 1930 was relatively small, as indicated in the accompanying map. (Fig. 88.) No new States were reached and new records of distribution were obtained from only five States—South Carolina, Connecticut, Massachusetts, New York, and Michigan—the newly infested areas in the last two States being very small. During 1931 two new States, Vermont and Rhode Island, have been invaded, and some new territory has been infested in Indiana, Kentucky, and Georgia.

It is probable that the severe drought of 1930 may have retarded spread toward Illinois and farther into the lower peninsula of Michigan. However, Massachusetts, Connecticut, and New York were not so severely affected by the drought and it is believed that the spread

there was normal. It is significant that for several years the beetle has not appreciably increased its range nor become more abundant along the northern limits of distribution, except in New England, and there essentially to the east rather than to the north.

#### Conditions in the Southern Range

On the other hand, in the more southern range in the Eastern States along, relatively mild autumn prevailed and the beetle completed a brood after the late summer rains. The winter of 1930-31 was favorable to its hibernation, with the result that the percentage of survival was above the average in Ohio and New York and possibly in other States. At Columbus, Ohio, the winter survival was over 5 per cent and at Athens, Ohio, over 8 per cent, which is the highest of record. At the Arlington Experiment Farm, Va., the survival was over 18 per cent, as compared with 33 per cent in 1930 and 62 per cent in 1929, while at Norfolk, Va., the survival was almost average for that area, approximately 50 per cent. At Geneva, N. Y., only 1.42 per cent survived the winter, but this is relatively high as compared with less than 0.1 per cent in 1930.

In general, fewer beetles than usual entered hibernation during the fall of 1930 owing to the effects of the drought, and the spring infestations were not so heavy.

The remarkable recuperative ability of the beetle was evident in Ohio, Tennessee, Alabama, North Carolina, New Jersey, and Long Island. In these areas considerable damage was done early in the summer and control measures were necessary.

The experimental work on the control of the beetle has been continued and results indicate that spraying with magnesium arsenate gives the best protection to beans from damage by this pest.

This spray requires 2 pounds of magnesium arsenate per 100 gallons of water. It is necessary to use about 100 gallons of spray per acre. Ordinarily four applications, prior to the setting of the pods, will control the beetle. Spraying with an arsenical after the pods are set is not recommended.

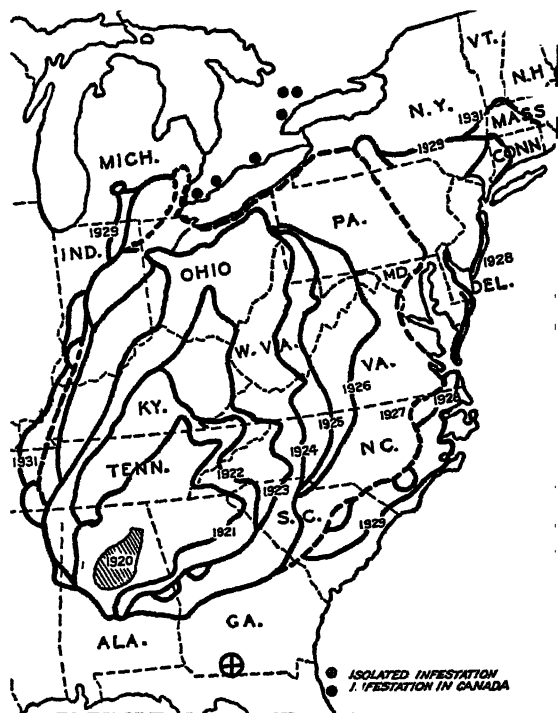


FIGURE 88—Spread of the Mexican bean beetle in the Eastern States from 1920 to 1931

NEALE F. HOWARD, *Bureau of Entomology.*

## MILK and Cream Imports Raised in Quality by Federal-Control Law

The Federal import milk act is designed to regulate the importation of milk and cream into the United States for the purpose of promoting the domestic dairy industry and for the protection of public health. The act was passed by the Sixty-ninth Congress of the United States, approved February 15, 1927, and became effective 90 days later. Following its enactment, it became necessary to institute a program of milk control that would bring all imported milk and cream within the provisions of the law. The standard as set forth requires: (1) That all cows producing milk or cream for importation into this country must be healthy, as determined by the tuberculin test and by physical examination at regular intervals by duly authorized veterinarians; (2) the sanitary conditions of dairy farms and plants producing milk or cream intended for shipment into the United States must be such as to score at least 50 points out of 100 points, according to the scoring methods prescribed by the Bureau of Dairy Industry; (3) certain definite bacterial limitations must be met by the producer of milk and cream before he can legally offer his product for entry; and (4) the temperature of the milk or cream at time of importation must not exceed 50° F.

Before milk or cream is offered for entry the shipper must hold a valid permit. The Secretary of Agriculture was given authority, under the law, to issue temporary permits to shippers pending completion of arrangements for the necessary inspections at source, and examination at ports of entry, to determine that all the provisions of the act had been met by the importer.

Active enforcement of the measure did not begin until the spring of 1928 and by June of that year a complete program of operation was being carried into effect. The Food and Drug Administration is charged with the responsibility of enforcing this law. Enforcement is centered in a station at Rouses Point, N. Y., since practically all importations of milk and cream originate in the adjacent Canadian Provinces. The enforcing agency consists of a station chief, a force of veterinarians, bacteriologists, clerks, and laboratory assistants.

### Farms Inspected in Canada

Veterinarians of the Federal and Canadian Governments are constantly traveling through producing sections of Canada inspecting dairy farms and receiving plants to see that all sanitary requirements are fully complied with. Physical examinations of all cows producing milk or cream for United States delivery are made at regular intervals to detect the presence of disease and to exclude unhealthy animals from such milking herds.

Federal bacteriologists examine samples of milk and cream collected by the inspectors at the various ports of entry. These examinations are made by the standard plate count, authorized by the American Public Health Association, for determining the number of living bacteria per cubic centimeter. The standards as prescribed in the act demand that there shall be not more than 300,000 bacteria per cubic centimeter in raw milk, 750,000 in raw cream, 100,000 in pasteurized milk, and 500,000 in pasteurized cream.

An important development of the past year has been the removal of cows with diseased udders from milking herds. This was facilitated through the issuance by the Dominion veterinary director general of

an order, October 21, 1929, to the effect that no Canadian herd would be approved for American trade in which there were animals suffering from mastitis or other functional diseases of the udder.

As a result of the enforcement of the import milk act, milk and cream coming from Canadian sources to-day are of good quality, the product of healthy cows as determined by strict veterinary supervision and bacteriological analyses. The milk and cream not only come from healthy herds and are produced under improved sanitary conditions, but all of the product is effectively pasteurized and transported, as shown by the inspections made under Federal control.

H. B. SWITZER, *Food and Drug Administration.*

**M**INERAL Mixtures for Livestock Misbranded if Claims Are Excessive Within the last few years, there has been an unmistakable tendency on the part of certain manufacturers of mineral mixtures to make many unwarranted claims for their products. This has been particularly noticeable in collateral advertising and in claims made by salesmen selling products from farm to farm. The claims vary, but they usually give the impression that the feeding of mineral mixtures to farm livestock, including poultry, will cure or prevent serious infectious diseases, prevent or control worm infestation, expel worms, purify the blood, prevent bloating and digestive disturbances, cleanse the intestinal tract, and increase egg, milk, and meat production.

The Food and Drug Administration considers mineral preparations actually labeled in this manner as misbranded under the Federal food and drugs act and is instituting vigorous action to prevent interstate trade in such mislabeled products.

Adding to the feed of animals certain inorganic or mineral substances, such as calcium, phosphorus, sodium, potassium, chlorine, and small amounts of iodine, iron, and copper, may supply elements deficient in the ordinary ration. The use of such products will not, however, create a resistance against contagious or infectious diseases, nor is there a sound reason to believe that the feeding of minerals is effective in the treatment of such diseases.

The restoration of a proper balance in a mineral-deficient ration through the addition of certain needed minerals may result in normal egg, milk, or meat production when decreased yields are due to a shortage of minerals in the feed. Decreased yields, however, may be due to many other factors, such as poor environment, feeds deficient in vitamins or other food substances, or chronic infectious and parasitic diseases. The Food and Drug Administration, therefore, believes that claims that the use of minerals will stimulate the production of milk, eggs, and meat, create an erroneous impression in the mind of the buyer.

Many preparations containing quantities of soft coal have been widely advertised as having value in controlling worm infestation in hogs. Veterinary studies have shown that neither coal, nor any other mineral substance administered in the feed, has proved efficacious in the control of any type of worms infesting hogs or any other animal. While coal or charcoal appears to be highly palatable to pigs, neither has striking food value nor any recognized therapeutic value.

### A Self-Limiting Disease

The disease known as necro, or necrotic enteritis of swine, according to veterinary investigators, is more or less self-limiting in nature. Given proper sanitary precautions, spontaneous recoveries are not unusual in the early stages of the disease. In view of this fact, many manufacturers of mineral mixtures have attempted to create in the minds of hog raisers, through claims on labels or in advertising, the impression that minerals are very effective in the prevention and treatment of this disease. Such assertions are at variance with sound scientific facts. As a matter of fact, the use of inorganic minerals in the treatment of this disease may actually aggravate the condition, since the mucous membrane of the intestinal tract is highly inflamed, due to the irritation set up by the causative factor of the disease.

The Food and Drug Administration has investigated many products of this type and, in the enforcement of the law, has removed many from the market. However, the administration can, under the law, exercise control only over curative claims made on the labels of feeds and drugs shipped in interstate commerce or in the circulars accompanying such goods. Legal control does not extend to curative or preventive claims made in outside advertising—on billboards, in newspapers, farm papers, and other periodicals. It is suggested that the prospective buyer compare these representations with the statements printed on the labels themselves.

H. E. MOSKEY, *Food and Drug Administration.*

**OFFICIAL Grading Service for Canned Fruits and Vegetables Inaugurated** For the first time the canning industry is being afforded an official canned fruit and vegetable grading service by the Federal

Government. The industry has struggled for years with the problem of grading, but there was not an official service until an appropriation became available for it July 1, 1931.

Previous appropriation acts authorized inspection and grading services on fresh fruits and vegetables, poultry, dairy products, and certain other farm products. The appropriation act approved February 23, 1931, broadened the authority of the Department of Agriculture by changing the language to read "fruits and vegetables, whether dry, raw, or canned," and made available a small appropriation with which to inaugurate the service. Included in the item, as usual, is the further authority to "charge such fees as will be reasonable for services rendered and will as nearly as possible cover the cost for the service rendered."

Much study has been given to the subject of grading canned foods by the Bureau of Agricultural Economics in connection with the administration of the United States warehouse act. Various sections of the canning industry have cooperated with the bureau in an endeavor to formulate practicable grades with which the various qualities of canned foods might be evaluated and catalogued. With the cooperation of the industry, grades for several canned vegetables were promulgated under the authority of the United States warehouse act. Slight revisions in the grades are being made as they appear

necessary and are being promulgated under the farm products grading law. These grades form the basis for the establishment of the new grading service.

### Interested Parties May Request Grading

Under the regulations of the Secretary of Agriculture governing the service, any party financially interested in a given lot of canned fruits and vegetables may request that the goods be graded. Grading offices are being located at convenient points throughout the United States. The applicant may request the representatives of the department to draw the samples from the lots to be graded; the samples may be drawn by a licensed sampler; or he may submit the samples himself. In any event, the certificate of grade reflects the grade of the samples drawn. Fees are collected for each lot graded, based on the size of the lot from which samples are drawn. Since the certificate is "admissible in all courts of the United States as prima facie evidence of the truth of the statements therein contained," its value as a commercial document in supporting sales is readily appreciated. These certificates become of great importance to bankers or warehousemen who finance stored stocks of canned foods. They form a most satisfactory basis for use in the settlement of disputes which may arise over the quality of merchandise. Some concerns are now quoting their products in the terms of the United States grades and offer to support the delivery of their merchandise with certificates of grade.

The service is being manned by experienced men, all of whom are full-time employees of the Bureau of Agricultural Economics. The graders are carefully trained before taking up their duties.

Grading service is being carried on at Philadelphia; Chicago; Washington; Louisville; and Tulsa, Okla. A temporary field office was operated during August, September, and October, 1931, at Easton, Md. Applicants, however, may request that samples be drawn by any of the farm-products inspectors in the 50 stations in the principal markets of the country. The inspectors will, in turn, submit the samples to the proper grading office for certification. Temporary field offices may be located in the more important producing areas throughout the United States.

### Heavy Demand from the Start

Although the service was not available until early in August, a very heavy volume of work was offered. Several Government departments requested the grading of samples of merchandise submitted to them in support of bids for their business, and requested grading of the merchandise upon delivery. The volume of grading for Government institutions alone has been quite heavy. The requests for commercial inspections from warehousemen, canners, buyers, etc., although the canning season was far advanced before the work was well under way, taxed the offices of the new project to their capacity.

Official grades are now available for canned peas, canned corn, both whole grain and cream styles, and canned tomatoes. Tentative grades have been drafted and are in use for canned beets, spinach, and mustard greens, Lima beans, snap (or string) beans, and sauerkraut. Studies are being carried on in connection with grades for additional canned vegetables as well as fruits.

PAUL M. WILLIAMS, *Bureau of Agricultural Economics.*

## **O**RANGE Refrigeration in Ocean Transport is Best When Fruit is Precooled

Valencia oranges are exported in large quantities to England from California. To study the conditions affecting the refrigeration of the fruit in transit and the consequent effect on decay, representatives of the United States Department of Agriculture have accompanied a number of shipments from Los Angeles to English ports. Electrical thermometer equipment installed in the holds of ships made it possible to follow changes in fruit and air temperatures during the 28 to 33 days in transit.

Data accumulated and observations made show that the principal factors reducing the efficiency of refrigeration are (1) high temperatures of fruit at time of loading, (2) inadequate circulation of refrigerated air through the load aboard ship, (3) the customary use of air that is not sufficiently refrigerated, and (4) the reduction in the refrigerating capacity of the ship on account of the high temperature of the sea water encountered.

The peak movement of oranges for export occurs during the summer, when the temperature of the fruit may range as high as 80° F. If the fruit is shipped to the docks in iced cars, the temperature can be reduced 10 to 15 degrees, but the greatest temperature reduction is obtained by precooling the fruit at the packing house. The benefits of this initial cooling are readily apparent when it is considered that most of the available ships are not equipped to reduce the temperature of warm fruit in large holds more than 10 to 25 degrees during the first eight days of a voyage.

### **Air Circulation Aids Refrigeration**

Circulation of air in fruit compartments increases the effectiveness of the refrigeration. The cold air enters at one side of the compartment and leaves at the opposite side after passing freely over the load and under the floor racks, and less freely through the load between the layers of boxes. The rate of movement of refrigerated air was found to have a very important bearing upon its effectiveness in cooling the fruit. Fifty changes of air per hour cooled the fruit in shallow compartments more uniformly and more rapidly than 30 changes per hour; reversing its direction every 12 hours likewise added to the effectiveness of the refrigeration.

The large lower holds are often 18 to 20 feet deep. The rate of cooling in them was found to be considerably slower than in the smaller shallow compartments. In some cases it was observed that much of the fruit in these large holds remained warm for two to three weeks; that is, for 50 per cent or more of its transit period. On account of the size and shape of these holds a much smaller proportion of the fruit is exposed to the free movement of refrigerated air over and under the stacks of boxes than in the smaller holds. In these holds over 50 per cent of the fruit is usually placed so that any cooling must come from refrigerated air traveling through the load. This is particularly serious if air circulation is not forced, as in the case of refrigeration from brine coils or from direct expansion pipes hung on the walls and ceilings of the holds.

Increasing the air space between the layers of boxes by increasing the thickness of the dunnage was found to permit more rapid and uniform cooling of the fruit. Dunnage 2 inches thick gave more satisfactory results than that only 1 inch thick.

The customary shipping temperature for oranges has been 40° F., but a comparison of the outturn of fruit carried at this temperature and of similar lots carried at 33° to 36° proved that the lower temperatures were preferable.

It was found that precooled fruit arrives in better condition than fruit loaded warm. With precooled fruit the task of maintaining low fruit temperatures was within the capacity of the refrigerating machinery, even in the lower latitudes near the Panama Canal and in the Gulf Stream, where the efficiency of the machinery was greatly reduced by the necessity of having to use warm sea water to cool the condensers. The high air temperatures encountered in this portion of the voyage also affected the temperature of the load, and it was found desirable to shade the decks of the boat with awnings to reduce the heat transferred into the interior.

W. R. BARGER, *Bureau of Plant Industry*

**O**RIENTAL Fruit Moth's Partial Control by Its Parasites Is Expected During the last few years the oriental fruit moth has become one of the most troublesome problems of peach growers in the eastern United States.

It has caused very severe damage to the crop over wide areas, and as yet no generally effective control measures have been devised. Fortunately this insect is heavily parasitized, and in sections where it has been established longest, the increase in the degree of parasitism has been accompanied by a very marked decrease in the quantity of wormy fruit. More than 50 different species of parasites attacking it have been reported from the United States; 10 have been reported in Europe, 7 in Australia, and at least 17 species have been reported from Japan. Most of the parasite species known in any one of these four areas do not normally occur in any of the other three. The parasites of this pest belong for the most part to the well-known families of parasitic Hymenoptera. A few species, relatively less important, belong to the parasitic flies of the family Tachinidæ. Within the area of infestation in the United States species that are regarded as important controls in one peach-growing center may be entirely absent in another.

#### The Possibilities of Control by Parasites

The information already gained from investigations of the parasites of the fruit moth indicates that partial control of this pest by its parasites may reasonably be expected over a large portion of the area at present infested, to the extent of materially reducing the high degree of fruit infestation occurring when parasites are absent or scarce. An example of such a reduction has already been observed in southern New Jersey. During its first years of destructiveness in this area parasitism was low, and the wormy fruit among Elbertas frequently exceeded 50 per cent. During the last five years parasitism has been very heavy, frequently exceeding 90 per cent of the infestation in twigs, and the infestation in Elbertas during the last three years has not usually been more than 10 per cent of the fruit and in some orchards has decreased to 3 per cent. This condition occurs in spite of the fact that there is normally a heavy first and second brood infestation of twigs. It is quite probable that parasites will never completely control this pest, since even under the most favorable conditions there will

always be a few worms escaping parasitic attack, and each worm renders a fruit unmarketable. It is self-evident, however, that a means of control that operates automatically to reduce the damage from 50 per cent to less than 10 per cent is greatly to the advantage of the peach-growing industry.

### Increasing the Effectiveness of Control by Parasites

In considering the relation of parasites to the problem of control of the fruit moth in the United States, it is necessary to decide what might be done to increase the effectiveness of the parasites. Without doubt, one of the most important steps is the search for, and introduction of, foreign parasites to supplement those already here. Particularly, those species should be introduced which will attack the stages of the insect at present least heavily parasitized, notably the egg and cocoon stages, or which will be more effective than any of the natives in certain sections where our own species have shown a lack of heavy parasitism. During the last year five species have been introduced from southern Europe and colonized in the United States. It is too early to tell how many of these will prove valuable. Several other species from Europe are being considered for introduction, as well as the three most important parasites of the fruit moth in the infested area about Sydney in Australia.

Another possibility is the distribution of indigenous species which have proved valuable in one section of the United States into other sections in which they do not occur as parasites of the fruit moth. A small yellow hymenopterous parasite, called *Macrocentrus ancylivora* Rohwer, has become very abundant and valuable in orchards in the coastal plain strip from southern Connecticut to southern Virginia. During the last three years large numbers of this parasite have been reared at Moorestown, N. J., and distributed to 160 localities in all the important peach-growing centers east of the Mississippi River in which the parasite was not known to occur. Although it is yet too early to determine the value of this work, the results are highly encouraging. The parasite has been recovered from nearly all the centers in which it has been liberated. In some it has demonstrated its ability to winter over and to increase rapidly until the percentage of parasitism approximates that of the area in New Jersey from which it was distributed. Several colonies of two other indigenous species have been released during the past year in areas in which they do not normally occur. Only one species has yet been found present in all the peach-growing centers studied. This is *Macrocentrus delicatus* Cress. It parasitizes the fruit moth heavily in some sections, notably in eastern Tennessee, but is of minor importance in others.

A third possibility is the mass rearing and liberation in orchards of large numbers of parasites at such a time as strongly to supplement the normal stock in securing crop protection. The species which most readily lends itself to this treatment is *Trichogramma minutum* Riley, a common egg parasite of the fruit moth. A number of large-scale projects are under way in various sections of the country for the rearing and the liberation of this species against several insect pests. The efforts of the Bureau of Entomology on *Trichogramma* in relation to the fruit moth are at present confined to an attempt to prove whether any economic value can be obtained from such liberations.

H. W. ALLEN, *Bureau of Entomology.*

## PACKAGE Bees May Be Used as Pollinating Agents in Orchards

The use of bees to act as pollinating agents in orchards has received special attention during recent years owing to the fact that in many localities the supply of wild pollinating insects is not only proving inadequate for the task but is actually diminishing. Among the reasons for such a decrease are clean orcharding practices, the cleaning up of fences and hedgerows, the clearing off of forests, the draining of swamps, and forest fires and floods. The bumblebee is only one example of a useful insect now rarely found in many localities where once it was abundant.

It is fortunate for the orchardist that one of the most efficient pollinating insects is the honeybee. Roughly speaking, this is the only insect available to the orchardist to be used for pollinating purposes when he pleases, where he pleases, and in such quantities as he pleases.

In the past the orchardist has made use of full colonies of bees for his pollinating work. Usually these colonies were rented of some beekeeper or were owned by the orchardist himself. However, many orchardists are interested in bees only for the aid they render in pollination and do not care to go to the extra trouble and expense of managing colonies of bees during the remainder of the year. In many localities it is not feasible to rent colonies from beekeepers. In such cases the "orchard package" should prove of great value.

The orchard package has been a development in the package-bee industry during the last year or two. The package-bee industry first developed in response to the needs of beekeepers for worker bees to strengthen weakened colonies and to establish new colonies. "Package bees," to employ this term in its beekeeping sense, are bees shaken from their original combs into small boxes of light wood and wire screening. These boxes are provided with some device on which the bees may cluster, and with food—usually a can of sirup. Bees may be shipped long distances in such boxes. Package bees are produced chiefly in the Gulf Coast States and in California. For long-distance orders they are commonly shipped by express or mail. (Fig. 89.)

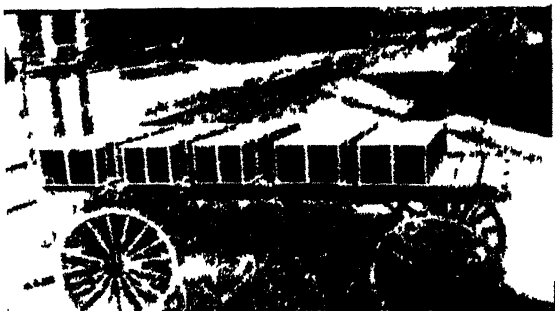


FIGURE 89.—Package bees ready for shipment

### Orchardist's Task Simple

The orchard package is prepared as described for package bees in general, although some types contain a comb of honey. The chief purpose of most of these types is to provide sufficient food to maintain the bees during the period of pollination, since the bees are to fly directly from the package and are to have a queen. The flight entrance of the orchard package is already corked when the package is received. All the orchardist has to do is to set the package in his orchard just at the beginning of pollinating time and pull the cork to

let the bees out. At times it may be necessary to wrap the package in newspaper, roofing paper, or some similar material to protect the bees from cold.

The orchard package should contain not less than 3 pounds of bees. At least one package per acre should be used. The packages should be scattered separately through the orchard and should not be grouped together. Under favorable weather and floral conditions the bees are at work soon after the orchardist has opened the entrance of the package. When the pollinating season is over he may dispose of these packages to some beekeeper or otherwise.

Information as to where bees can be secured for pollinating purposes may be obtained from State beekeeping associations, State beekeeping officials, or the Division of Bee Culture of the Bureau of Entomology.

W. J. NOLAN, *Bureau of Entomology.*

## PASTURE Lands of U. S. Vary Regionally in Main Characteristics

In considering the pasture lands of the United States, a study of the native vegetation as it existed before the advent of the white man is very helpful. According to Shantz and Zon,<sup>1</sup> the native vegetation was originally divided into five main biological communities: (1) From the Atlantic coast to approximately the ninety-fifth meridian, the country was a vast and almost unbroken forest. (2) West of these forests was an area of prairie lands occupied by tall grasses, extending from central Illinois through northern Missouri, Iowa, and western Minnesota to eastern Kansas, Nebraska, South Dakota, and North Dakota. (3) Immediately west of this was a belt of semiarid, rather level lands bounded on the west by the foothills of the Rocky Mountains and occupied very largely by short grasses. (4) From this line to the Sierra Nevada and Cascade Ranges on the Pacific coast was a vast region occupied by forests, desert grasses, and desert shrubs, the forests being confined chiefly to the higher elevations. (5) The area west of the Sierra Nevada and Cascade Ranges was largely forests in the humid northern part. In the southern part, because of greater aridity, the forests were confined to the immediate coast line and to higher elevations of the mountain ranges, and the interior valleys were occupied very largely by desert shrubs and grasses. The characteristics and productiveness of pastures are correlated to a considerable degree with the original vegetation. (Fig. 90.)

Since the settlement of the Eastern States by Europeans a great part of the forests have been removed through lumbering operations or destroyed by fire. Much of the land thus cleared is now devoted to harvested crops, and of the 359,242,091 acres of crops harvested in the United States in 1929, approximately five-sixths are in the eastern humid region, which was originally largely forest land.

The fact that forested regions in their natural state are not useful as grazing lands has been established by centuries of experience. Therefore, the only natural pastures in the eastern United States were the prairie grasslands of Illinois, Iowa, and adjoining States. The native grasses in other parts of the eastern United States were of compara-

<sup>1</sup>SHANTZ, H. L., and ZON, R. GRASSLAND AND DESERT SHRUB. 29 pp, illus. U. S. Dept. of Agr. Bur. Agr. Econ. Atlas of American Agriculture. Part I. The Physical Basis of Agriculture. Section E, Natural Vegetation. 1924.

tively little value for grazing purposes. Throughout all this region however, excellent pastures have been established by the introduction of foreign grasses and legumes.

### Use of Tame Grasses in Pasture Improvement

The improvement of pastures with tame grasses has been successful only in the eastern humid region and in the humid northern part of the Pacific slope. In the eastern United States the use of tame grasses is limited on the west by rainfall conditions. The rainfall limit for tame grasses at the Canadian boundary is approximately 18 inches; in South Dakota, 21 inches; Nebraska, 25 inches; Kansas, 28 inches; and Oklahoma and Texas, 30 inches. In its irregular course from north to

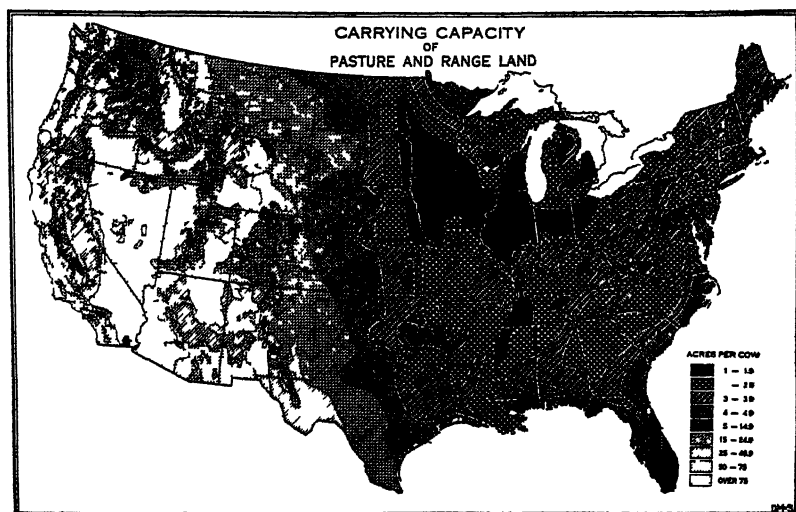


FIGURE 90—Map showing carrying capacity of grazing lands in the United States. In the eastern half of the country, the map is based on reports from 9,000 farmers as to acres used per cow. In general, cows are given supplementary feed, and it is probable that the acreage required per steer without supplementary feed would be more than the amounts shown. The western half of the map outside the national forests was prepared by the Land Classification Board, United States Geological Survey, and within the national forests by the United States Forest Service. In the Southern States the map represents in general the carrying capacity of improved pasture.

south the line of demarcation between the tame-grass and the native-grass pastures begins on the Canadian boundary at 99° west longitude, swings about 2 degrees east of south, and strikes the Gulf coast of Texas at approximately 97° west longitude. (Fig. 91.) The reason for the progressive increase of rainfall required from north to south is of course the interrelation of temperature and rainfall as these forces affect vegetation. The mean annual temperature at the Canadian line is 35° to 40° F.; in Texas it is 65° to 70°. West of this line very few tame grasses succeed until the Pacific slope of the Northwestern States, Oregon and Washington, is reached. In the dry interior between the Sierra Nevada and Cascade Mountains on the west and the western edge of the humid belt, livestock are almost wholly dependent upon native forage plants, except for very limited acreages of irrigated lands and especially favored rainfall areas such as those represented by the alpine meadows.

In the eastern half of the United States, where rainfall is not the limiting factor, there is a more or less indefinite line separating the distinctly northern grasses like Kentucky bluegrass, timothy, and red-top, from the southern grasses, such as Bermuda, carpet, and Dallis. The 60° isotherm very nearly marks this division line. (Fig. 91) In the Great Plains and intermountain region rainfall is the controlling factor and temperatures play a secondary part.

Soil conditions control the character of pastures only where the rainfall is sufficient so that the soil qualities become operative. The nature of the soil has much to do with the type of vegetation in the eastern or humid part of the United States, where tame or introduced grasses provide so much of the pasturage

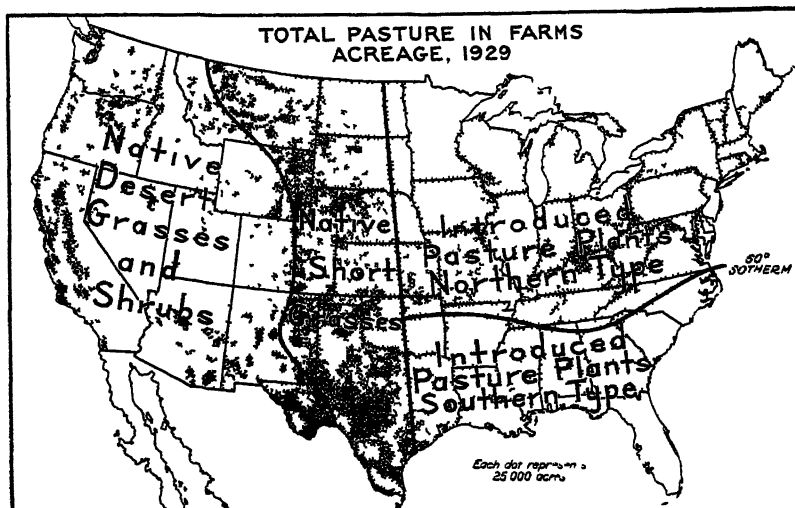


FIGURE 91.—The total pasture land in farms, based on the census for 1929, is 477,908 696 acres. The distribution in the East represents more nearly the entire pasture acreage than in the West, where a large proportion of the grazing land is not in farms. The most important class of pasture plants is indicated for each section.

### Extent and Productiveness of Pasture Lands

The distribution of the total pasture acreage as indicated by the census is also shown in Figure 91. Unfortunately the acreages given in the census reports include only the grazing land in farms, which represents but 36 per cent of the total grazing land. It is estimated, however, that these pastures in farms, including temporary pastures, supply the pasturage for 66 per cent of the total livestock. In the West the percentage of grazing lands not in farms is much greater than it is in the East because of the much greater areas of public lands in the West. However, in the Southeastern States such grazing land may become a factor in the support of livestock. The total pasturage on the vast acreage of cut-over lands in the piney-wood section of the Gulf States, much of which is not in farms, can not be ignored in any consideration of livestock production. From March until July, inclusive, such land has a carrying capacity of one animal unit for each 10 acres. The effective utilization of these lands will probably come through a combination of grazing and reforestation. The land outside of farms in the Northeastern and North Central States is not likely to be utilized to the extent to which similar land in the Gulf States will be util-

ized, because of the hardwood or broad-leaved character of much of this timber and the long winters, which not only make it necessary to provide much expensive harvested feed, but also require buildings to protect livestock from cold.

West of the ninety-eighth meridian, where the native grasses have been destroyed by cultivation or overgrazing, crested wheatgrass, brome grass, and slender wheatgrass may be employed to good advantage in restoring such land to pasture uses. Nowhere in this region, however, is it advisable to attempt the improvement of grazing lands by replacing the native grasses with introduced species. Improvement is best accomplished by encouraging the better native forage plants through properly controlled grazing.

In the short-grass region, which is ordinarily designated the Great Plains, the grazing lands have an estimated average carrying capacity of one animal unit to 5 to 15 acres in the eastern one-third, and one

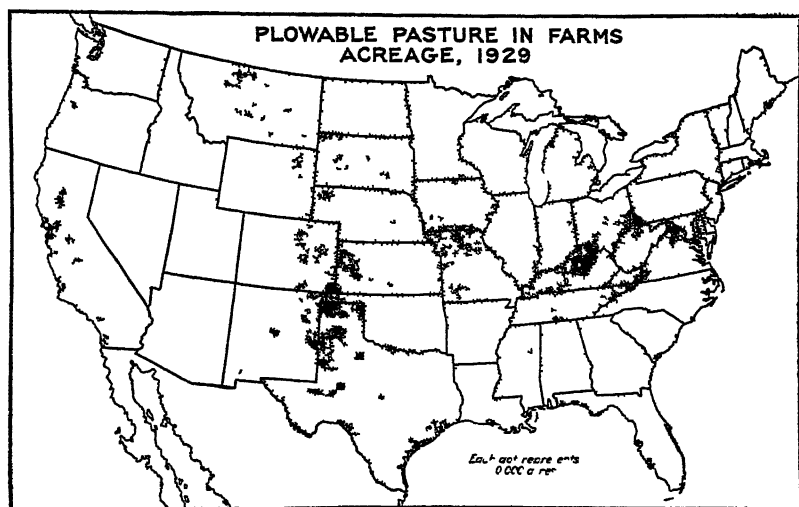


FIGURE 92.—Distribution in 1929 of plowable pasture land in farms, based on the census, is 136,517,469 acres. This part of the pasture acreage is not only the most productive in its natural state, but is capable of the most improvement.

animal unit to 15 to 25 acres in the western two-thirds. (Fig. 90.) In the Great Plains there are, according to the Census Bureau, 187,022,070 acres of pasture in farms, of which 38,111,591 acres are plowable. West of the Great Plains, in the Great Basin and intermountain region, are mostly semidesert lands, 25 per cent of which are rated as having a carrying capacity of one animal unit to 25 to 50 acres. The remainder of this region is occupied largely by desert shrubs such as sagebrush in the north and creosote bush in the south. On such lands 75 acres or more are required to support one animal during the grazing season. In this western section the Census Bureau recorded a total of only 115,962,712 acres of pasture land in farms, 8,564,927 acres of which were plowable, and 107,397,785 unplowable. A large percentage of the grazing land is outside of farms and therefore not included in the census enumeration.

In the eastern humid area north of the 60° isotherm there are 134,021,394 acres of pasture land in farms; of this 77,946,250 acres are what the census terms plowable pasture. (Fig. 92.) This plowable pasture

is capable of improvement by fertilizer applications, and seeding with such grasses as Kentucky bluegrass, timothy, redtop, brome grass, orchard grass, and clovers and lespedeza. Unimproved, such pastures have an average carrying capacity of one animal unit to 2½ acres, but they may be improved to a point where 1½ acres or less will suffice to support an animal unit.

The remainder of the pasture land in this section, 56,075,114 acres, is woodland pasture and land too rough or stony or wet to be available for cultivated crops. Such land is not sufficiently productive to justify any considerable expense in improving it. From 5 to 10 acres are required for each animal unit, according to conditions.

South of the 60° isotherm there are, according to the census, 40,902,520 acres of pasture land in farms; of this 11,892,721 acres are plowable pasture capable of being improved by the application of fertilizers and by being seeded with Bermuda, carpet, and Dallas grasses combined with lespedeza, hop clover, white clover, and black medic. The remaining 29,009,781 acres of the pasture land in farms is largely cut-over or burned-over forest land or land that is untillable for other reasons. Such land is occupied largely by native grasses, mostly *Andropogon* and *Panicum* species, and approximately 10 acres are required for each animal unit.

H. N. VINALL and C. R. ENLOW, *Bureau of Plant Industry.*

**P**ASTURES Should Supply Fully 50 per cent of the feed for livestock in the United States comes a Larger Proportion of directly from pasture and range. Feed Used by Livestock

This is equivalent to saying that half of all the meat, milk, wool, hides, and horse and mule power is produced directly by grazing. That grass is the cheapest feed has been so generally accepted that not much effort has been made to prove it experimentally. Few direct comparisons have been made to show definitely the relative returns from land—(1) in cultivated crops raised to be harvested and (2) in permanent or temporary pastures intended for grazing. In general the policy has been to cultivate as much land as possible, leaving for pasture chiefly land unfit for cultivation because it is too rough, too dry, too wet, too poor, or otherwise unsuitable. If tillable land is used for pasture, the area is often limited to that barely sufficient to carry stock through the grazing season. Such a practice, of course, necessitates heavy feeding of harvested crops during periods of pasture shortage. Another consequence of limited pastures is that, when overgrazed (fig. 93), they do not begin to supply the maximum quantity of feed. In fact, the desirable forage plants are often greatly reduced or completely killed out by extremely heavy grazing. This is particularly true in areas of limited rainfall.

Experiments to determine the influence of various land rotations on the quantities of beef, pork, and mutton produced from a given area are in progress at the Illinois Agricultural Experiment Station. Four fields are being used, one of which is in bluegrass and the other three in 4-year and 5-year rotations of corn, small grain, soybeans, sweetclover, and the Haas pasture mixture. The Haas mixture, originated by Ralph Haas, an Illinois farmer, consists of 2 bushels of oats and 2 pounds each of sweetclover, red clover, rape, alsike clover, and timothy. It is sown in the spring and furnishes excellent grazing for two

seasons. The first season the pasture consists largely of oats, sweet-clover, and rape; the second season timothy, alsike, and red clover furnish the bulk of the pasture, with sweetclover helping out. Though conclusions are not yet available, the experiments deserve close attention by stockmen.

Analyses of samples of young grass have shown that the quality of the feed can be changed greatly by fertilizers, particularly on impoverished soil, and much interest is being shown in this phase of pasture improvement. Many experiments relating to the use of fertilizers on old pastures and new seedings are under way in this country.

Experiments have also been designed by which to study pasture management, and tests involving rotation, grazing, deferred grazing, and continuous grazing are in progress. Supplemental grazing crops, such as Sudan grass, sweetclover, rape, soybeans, and others, are under grazing test to determine their relative value for supplying green feed

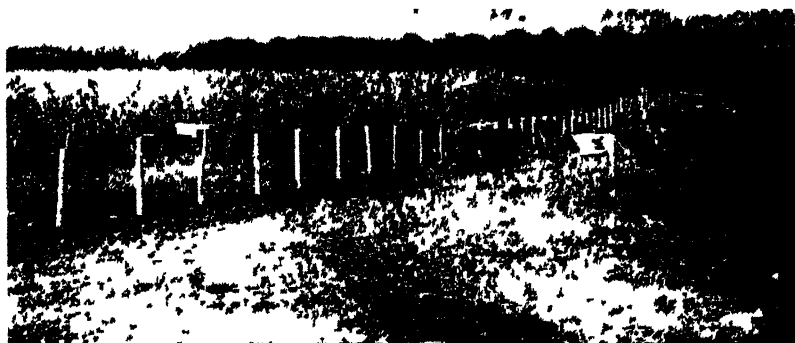


FIGURE 93.—Pastures that are too heavily grazed not only fail to yield maximum returns but also require the use of more expensive supplementary feed during periods of drought

during dry summer weather, when permanent pastures frequently drop in production. From the intense interest manifested in the experimental work under way, it is evident that farmers and others realize the importance of pastures in the economical production of livestock and livestock products.

### The Hohenheim System of Grazing

Much interest has been shown the last few years in a system of grazing dairy cows on limited areas of pasture in Germany and England. The system, which was devised in Germany, is called the Hohenheim system and combines rotation grazing with intensive pasture fertilization. The grazing land is divided into from 6 to 10 pastures, each grazed in turn by high-producing dairy cows followed by low producers and dry animals. A complete rotation is made in from three weeks to one month. When the animals are removed from a pasture, nitrogenous fertilizers are applied to insure rapid growth of high-protein forage.

The indications are that such practices are justified for milk production, where it is desirable to use high-priced land for grazing and where there is adequate and well-distributed rainfall.

The apparent success of this system in Europe has resulted in several trials in this country. The system, with various modifications, is under test at the State experiment stations of Massachusetts, Ohio, Michigan, and Wisconsin, and several dairy farmers are using modified forms of it in New England. A replication of the Hohenheim system as originally devised is under test at the United States Department of Agriculture experiment farm at Beltsville, Md., in comparison with continuously grazed pasture. This work is carried on cooperatively by the Bureau of Dairy Industry and the Bureau of Plant Industry.

### Advantages of Fattening Livestock on Pastures

The Kansas and Ohio experiment stations have recently shown the rather remarkable advantages of fattening cattle on pasture as compared with fattening similar cattle in barns or dry lots. On the same rations of concentrates, pasture-fed cattle at the Ohio station gained 11 per cent more than barn-fed cattle and 16 per cent more than cattle fed in an open shed. As a consequence, the cost of gains for the pasture-fed cattle was correspondingly lower. The cost of silage and hay fed in dry lot was slightly more than the estimated value of the pasture. The pasture-fed cattle dressed practically as high as the cattle fed in dry lots.

At the Purdue (Ind.) and Mississippi stations, the high value of pasture has been brought out strikingly in lamb production. The grade of lambs and the palatability of the meat of lambs slaughtered when from 4 to 5 months old were influenced relatively little by grain fed as a supplement on good grass while the lambs were suckling the ewes.

Pastures also have an important place in profitable swine production. According to experiments conducted by the Bureaus of Animal Industry and Plant Industry at Ardmore, S. Dak., hogs fattened on pasture supplemented with concentrates, self-fed, may be expected to make approximately 10 per cent more gain than they will on the same feeds in dry lot. When fed in dry lots, hogs require about 10 per cent more concentrates per 100 pounds gain than do pasture-fattened hogs. The experiments also showed that when hogs were on pasture only 8 per cent of the feed consumed was tankage, whereas in dry lot 12 per cent of the rations selected by the hogs was tankage. In addition, the use of clean pastures in what is known as the swine-sanitation system materially reduces pig mortality and stunted growth and enables hogs to reach market weight practically free from parasites.

In the management of farm work stock, feed and labor requirements may be considerably reduced by turning the work animals on pasture at night during the grazing season. They may be kept advantageously on pasture with a reduced grain ration during short idle periods, and with no grain at all during long periods of idleness.

### Ample Pastures Bring Benefits

In addition to such direct advantages in livestock production there are other important advantages in making maximum use of pasturage. Depletion of soil fertility is less rapid, since the animals' droppings are returned to the soil without loss and at no expense. On rolling

land, such as that in northern Missouri and southern Iowa, as much erosion takes place in one year on cornland as in about 47 years on bluegrass pasture.

The area of land used for hay and grain crops in the United States is almost five times that of land in improved pasture. Ten per cent of the cultivated-crop acreage sown to pasture would add approximately 50 per cent to the present area of improved pasture land. Such a change would reduce grain crops materially, reduce the labor spent for crop production, reduce erosion, provide more adequate pasturage for periods of drought, relieve pastures now overgrazed throughout the season, and preserve wood lots—all without increasing farm expenses or the supply of animal products. These results appear to be in general accordance with present sound agricultural practices.

A. T. SEMPLE, *Bureau of Animal Industry*,  
C. R. ENLOW, *Bureau of Plant Industry*.

**PEA-WEEVIL Damage Can be Decreased by Certain Farm Practices** In sections where the pea weevil has been introduced, certain farm practices are largely responsible for the presence or absence of heavy infestations of the insect. Instead of focusing attention on the fumigation of the peas just before planting them, consideration should be given to the important points of (1) the time and method of harvesting the crop, (2) the treatment of the seed after harvest, and (3) the disposition of the peas left in the field as waste after harvest. Proper attention to these points will materially reduce the infestation in the next year's crop or will prevent the building up of heavy infestations.

#### Factors Governing Time and Method of Harvesting

The peas should be harvested as early as possible. Aside from consideration of the pea weevil, early harvest of most varieties is desirable to prevent loss from shattering, because the longer the peas stand after being ripe the more the pods are likely to split open and shed the peas. When pea weevils are present, it is more desirable to harvest early so that the crop can be fumigated to kill the contained weevils before they emerge and thus prevent further damage. Early harvest also prevents the escape of many pea weevils in the field. The weevils which escape seek shelter, hibernate, and come out in time to infest the next year's crop. Early harvest is possible only where the peas are planted alone or with another early maturing crop. The acreage should not be too large to be harvested quickly with the machinery and help available.

The method of harvesting must be determined largely by the size of the crop and by climatic conditions. Obviously, the methods would not be the same in a small garden and in a 500-acre field. Neither would they be the same in a windy section and in a wind-free section. Whether the crop is large or small, whether it is harvested by hand or by the most modern machinery, care should be exercised to reduce the loss from shattering as much as possible. If the peas are mowed and raked, these operations should be performed before the vines are over-ripe and while they are yet damp. Care should be taken not to trample the pea vines more than is necessary. A good track clearer should be

used, so that the wheels of the mowers and rakes will shell out the minimum quantity of peas.

Where heavy windstorms are frequent at harvest time, heavy losses may occur if the peas have been cut and left in windrows or in piles, as the wind rolls the peas about in the field or even carries them away. (Fig. 94 ) In such places it may be more economical to use headers for harvesting the peas. In sections where there is little danger from windstorms, combine harvesters equipped with pick-up attachments are very satisfactory. In either case care should be taken to leave as little of the crop on the field as possible. The fields should be properly opened so that the peas are not trampled down or left around the

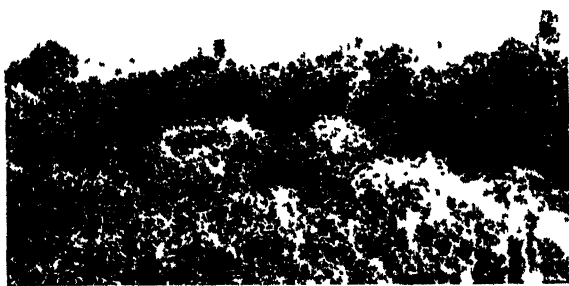


FIGURE 94 —Peas that have been rolled about by the wind

outer edges of the field. Threshing should not begin in the morning until the vines are dry enough to thresh well or many of the peas will go through with the straw. In some instances as many peas as were harvested, or even more, are left on the ground. Field counts have shown that from 500,000 to 3,000,000 peas per acre are wasted in this manner.

The number of pea weevils thus left in the field to infest the next year's crop depends upon the percentage of infestation as well as upon the number of peas left.

#### Fumigation of the Entire Crop Necessary

The entire crop should be fumigated. Under the present practices in some sections, as many of the weevily peas as possible are separated out at the cleaner. The peas that are supposed to be free of weevils are then fumigated and placed on the market, while the screenings, containing most of the weevil-infested peas, are not fumigated. Frequently the screenings are returned to the farm to be used as feed for livestock. The screenings are often sacked in a poor grade of sacks, some of which have holes that permit the weevils to escape and seek suitable shelter for the winter. Even when the screenings and weevily peas are ground up for feed, many of the weevils escape. The whole crop should be fumigated immediately after harvest and before it is cleaned.

#### Peas Remaining in Field Must Be Destroyed

As has already been pointed out, the loss of peas at harvest time is usually very great. The disposition of these unharvested peas is a very important problem in the control of pea-weevil infestations. The pea weevils in the harvested peas can be exterminated by fumigation, but those left on the field in the unharvested peas emerge and seek winter shelter. They are capable of withstanding low tempera-

tures and they select locations for hibernation where they are well protected from storms and from predacious enemies. They seem to prefer to hibernate under the rough bark of such trees as pines, firs, oaks, etc., and in the moss, liverworts, and lichens attached to the trunks and branches of the trees. They also hibernate in the cracks in fence posts and telegraph poles, and in cracks and under shingles of barns and other outbuildings. As many as 500 pea weevils have been found crowded into the cracks of one fence post adjoining a badly infested field. After living through the winter in these places, they come out in the spring to feed on pollen from different kinds of flowers until the pea pods begin to form. They are then ready to lay their eggs on the young pods.

In small gardens it would be an easy matter to care for the peas which are usually left. Peas which become too old and hard to be eaten green are often left on the vines without being harvested. If they are not being kept for seed, they should be destroyed before they ripen. The vines should be gathered and fed to livestock or destroyed, so that the contained weevils will have no chance to complete their development and emerge. Peas that are being grown for seed should be gathered as soon as they are ripe and fumigated immediately.

In large fields the problem is different, as the unharvested peas are on vines that were missed or else they are scattered on the ground so that they can not be gathered economically. Any practice is beneficial if it reduces the number of peas before the pea weevils have time to emerge. The warm ground and hot sunshine hasten the development of the pea weevils, so that they begin to emerge within a few days after harvest and in some sections they are practically all gone from the peas within two or three weeks. Therefore, anything that is intended to reduce the weevil population must be done immediately after harvest.

Sheeping off or hogging off the field immediately after harvest will prevent the emergence of some weevils, but will allow enough weevils to escape to infest the next year's crop. Immediate plowing kills some of the weevils, but allows many to escape.

From the standpoint of controlling the pea weevils the most satisfactory and thorough method of disposing of the unharvested peas is immediately burning the stubble on the field. This can be done very readily if the crop has been harvested with a header or a combine having a revolving fan for spreading the straw over the ground. Burning would not permit of the greatest utilization of the pea straw for feed and fertilizer, but in sections where weevil damage is the limiting factor it is better to lose the straw than to have to discontinue the growing of the pea crop.

Burning the hedgerows around the field in the fall will kill many weevils that have found shelter there, and will be a protection to the next year's crop. Before burning is attempted due precautions must be taken to prevent the fire from getting out of control and spreading to other crops and buildings. Usually, besides obtaining a fire permit, it is necessary to plow a few furrows around the outer edges of the field which is to be burned. Around fields that are removed from timber in which weevils can hibernate, metal fence posts are preferable to the ordinary wooden posts, in which hundreds of weevils can spend the winter. Metal fence posts also permit a more thorough burning of the hedgerows.

Farm practices which tend to reduce pea-weevil damage, then, are (1) early and careful harvesting of the crop, (2) thorough fumigation of the whole crop, and (3) immediate destruction of peas remaining on the field after harvest.

A. O. LARSON, *Bureau of Entomology.*

## **P**ERISHABLE Commodities Act Promotes Prompt Settlement of Disputes

The object of the perishable agricultural commodities act is to suppress unfair and fraudulent practices in the marketing of perishable agricultural commodities in interstate and foreign commerce. The act seeks to accomplish this by providing that commission merchants, dealers, and brokers must secure licenses from the Department of Agriculture and that violations of the act may be punished by publication of the facts or by suspension of the offender's license for a period not exceeding 90 days or by both publication and suspension. For repeated or flagrant violations an offender's license may be revoked. If a complainant can demonstrate that he has suffered damages because of the action of an offender the Secretary of Agriculture can issue a reparation order in the amount of damages.

Complaints may be filed under this act in person, by telegraph, by telephone, or by mail. For the most part complaints are filed by telegraph or by mail, about 40 per cent being filed by telegraph and 60 per cent by mail.

Practically all of the complaints filed by telegraph relate to cars which at the time are standing on track and on which quick action is desired. Most of such complaints pertain to rejections of cars by receivers, but there are many instances of receivers complaining against shippers on the ground that the goods in the cars on track fail to comply with the specifications set forth in the contract. The department gives prompt attention to telegraphic complaints and in most cases succeeds in effecting a settlement. If an amicable settlement can not be reached the complainant is advised that a formal complaint from him will be entertained if he has the evidence to support it.

Complaints received by mail relate to transactions in which the goods in question have been disposed of, immediate action therefore not being necessary. These cases may cover cars which were rejected and sold by the shipper for the receiver's account, cars refused by the receiver on account of alleged failure to deliver in accordance with the contract, cars accepted by the receiver but which he claims did not comply with the contract, shipments for which payment has not been received or regarding which it is felt an incorrect accounting was rendered, or cases of making false or misleading statements regarding the quality, quantity, or disposition of, or the condition of the market for, any perishable agricultural commodity received in interstate or foreign commerce.

### **Procedure in Telegraphed Complaints**

When a complaint which seems to warrant investigation is received by telegraph the department immediately wires to the party complained of setting forth the facts as they have been presented and advising him that if these statements are correct he has violated the act. He is

asked to wire his side of the case so the department can take proper action. In many instances it is necessary also to wire the broker in the transaction for his confirmation and to wire the delivering railroad as to time of delivery. When sufficient facts have been presented the department expresses its opinion in the matter and endeavors to effect a settlement.

Complaints which are presented by mail are handled in very much the same manner except that communications are by post instead of by wire. When a complaint is received it is reviewed and, if found to come properly under the act, and if the facts presented justify action, a letter is addressed to the party complained against, setting forth in detail the allegations made and calling on him to satisfy the complaint or to furnish good and sufficient reasons for failure to do so. If the reply to this letter is unsatisfactory, and efforts to effect a settlement seem to be useless, the complainant is requested to file a formal complaint along the lines indicated in the sample furnished him, and upon receipt of this complaint the papers in the case are forwarded to the solicitor of the department for consideration, with a view to holding a hearing.

Such a hearing must be held in a city in which the party complained of is engaged in business. The Secretary's decisions are based upon the record of the evidence presented at the hearing, taking into consideration any briefs which may have been filed or any arguments which may have been made on behalf of the parties involved. These decisions review the facts in the case, discuss and decide any legal points involved, and state whether the case is to be dismissed or whether a reparation order is to be issued and, if so, the amount thereof, and fix the punishment which the Secretary feels should be inflicted.

H. A. SPILMAN, *Bureau of Agricultural Economics.*

**P**IGS Produce Pork More Efficiently on Limited Feed Levels Do pigs which are allowed all the feed they can consume produce pork more economically than those fed on a restricted basis? It is true that full feeding or self-feeding generally produces the most rapid gains and shortens the time required for a pig to reach market weight. Results of recent feeding tests conducted at the United States Animal Husbandry Experiment Farm, Beltsville, Md., have shown, however, that decreasing the feed intake to as low as 50 per cent of a full feed resulted in an increasing efficiency in the conversion of feed into pork.

### Tests Show Material Savings in Feed

In a test conducted during the fall of 1930, three lots of pigs were fed 2, 3, and 4 pounds of feed, respectively, per 100 pounds live weight, daily. The ration consisted of corn, tankage, alfalfa meal, and mineral mixture in proportions to give a nutritive ratio of approximately 1:5.5. The pigs were kept in dry lots without access to pasture and were hand-fed individually twice daily in a compartment feeder. They weighed approximately 68 pounds each at the beginning of the test and were slaughtered when they reached weights of approximately 200 pounds.

The pigs on the 4-pound allowance required only 119 days to reach slaughter weight, but they consumed an average of 559 pounds of feed to do so. On the other hand, even though the pigs on the 2-pound allowance of feed required 166 days to reach the same weight, they consumed, on the average, only 395 pounds of feed. Thus, the restriction of the feed from 4 to 2 pounds per 100 pounds live weight resulted in a saving of over 150 pounds of feed on each pig even though additional time was required to reach market weight. The pigs on the 3-pound allowance were intermediate to the other two lots. They reached an average weight of 200 pounds in 128 days and consumed 458 pounds of feed. One hundred pounds of feed thus produced 32, 29, and 24 pounds of pork when fed at the 2, 3, and 4 pound levels, respectively. In other words, the most restricted lot produced a third more pork on an equal amount of feed but in a 40 per cent longer feeding period than the full-fed lot. No injurious or distressing effects upon the physical development of the pigs were observed even in the lowest feeding level.

### Restricted Feeding Produces Lean Pork

There was also a marked difference in the leanness of the pork produced by the high and low feeding levels. The leanest pork was produced on the lowest feeding level. This was accompanied with an increased yield of the higher-priced lean cuts such as the ham and loin. In view of the growing market demand for lean rather than fat pork and the higher prices paid for the lean cuts, the pork from pigs fed on a restricted basis may yield an increased return in the meat market.

The results of these tests indicate that restricted feeding of the grain ration may be applied, with profit, to average feed-lot conditions. One of the main requirements, of course, is the use of a well-balanced, nutritious ration which supplies the materials necessary for growth rather than for fattening.

Because of the longer feeding period and possible extra work required in limited feeding, the cost of labor may offset the advantages mentioned. But especially when the feeder wishes to carry his pigs through the seasonal periods of low prices to those of increased prices the saving of feeds is likely to be great enough to warrant the extra time and labor.

N. R. ELLIS and J. H. ZELLER, *Bureau of Animal Industry.*

**P**INE Seedlings Show Response to Sunlight in Growth and Density      How much sunlight do young pine trees in a forest need in order to establish themselves and grow? The answer was sought in a virgin Norway pine stand on the Chippewa National Forest, Minn., which is probably typical of the primeval forest of the Lake States. (Fig. 95) The old trees average 200 years in age and attain heights of 80 to 100 feet.

The old trees bear abundant seed at fairly regular intervals. In some places a plentiful crop of young pine seedlings has come in, while in other places the undergrowth contains no pines. If the presence or absence of pine seedlings and their growth when present were considered in relation to the amount of sunlight they receive, the nature of this relationship would answer the question about sunlight.

The question was asked the young pines themselves by measuring the light available and noting their abundance and rate of growth.

The young pines answered that both their abundance and growth are determined to a considerable degree by the amount of light they receive, and both increase with increasing light. Figure 96 shows graphically the annual height growth and abundance of young pine for different amounts of light. In light values below 5 per cent of full sunlight, pine seedlings were either absent or in such poor condition that survival was impossible. With 35 per cent light there were over 9,000 seedlings per acre, or ample numbers to restock the area completely after cutting. With increasing amounts of light the density of the seedlings continued to increase. At 93 per cent light there were over 18,000 seedlings per acre. Densities much greater than 9,000 per acre often result in overcrowding and stagnation



FIGURE 95—Virgin Norway pine stand with Norway pine reproduction in a small opening. The young trees are 18 years old and 4 to 5 feet high

Where young seedlings are not present in virgin Norway pine forests having 35 per cent light, or more, the timberland owner may be sure that no method of cutting the old stand is likely to bring them in.

#### Densest Stand Had 17 Per Cent Light

At no place in the forest was the shade of the old trees so dense as to exclude young pines. The densest pine stand had 17 per cent light and 3,500 seedlings per acre. Hazelnut, alder, and other brush species reduced the light to less than 5 per cent, in which no pine seedlings survived long.

The response of young seedlings to increased light showed that height growth in young pines receiving 30 per cent light or less is so slow that they can not outgrow the competing shrubs and young hardwoods. Trees in full sunlight were making the fastest growth. Here, however, competing vegetation is most aggressive; hence, unless the

pine seedlings have already become established and made sufficient growth to hold their own against other plants, it is easier for them to start in slight shade (50 per cent light, or more) where competitors are less vigorous. The importance of competing vegetation can scarcely be overemphasized.

Nature, when undisturbed by fire or man, provides the surest method of perpetuating the pine forests. The forester would call it selective logging by groups. It consists of enlarging gradually small openings where young pines are already established. Where no seedlings are present small openings made by cutting should be sown or planted. Surrounding trees protect the young seedlings from excessive heating and drying until they attain sufficient size to thrive in full sunlight. Enlarging the opening allows a second group of seedlings to start. If the openings are properly spaced the entire area should be reforested by the time the third cutting is completed.

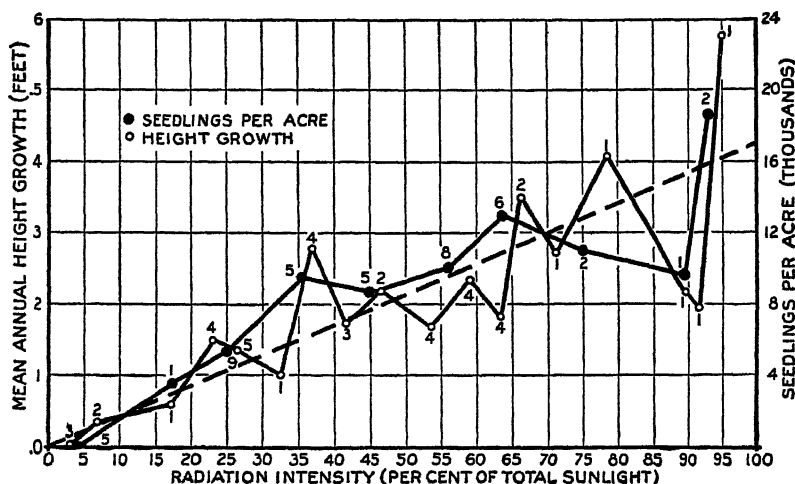


FIGURE 96.—Height growth and abundance of Norway, white, and jack pine reproduction growing in various light values in a virgin Norway pine forest

The answer to the original question, then, is that for good establishment young pines need about 35 per cent light, or about the amount present after a well-stocked, mature stand has had a light cutting. For best growth, young pines past the seedling stage need full sunlight.

HARDY L. SHIRLEY, *Forest Service.*

## PLANT-DISEASE Hazards, Though Very Fluctuating, Demand Constant Action

Among the hazards that must be faced in the production of many of our major crops, one of the most poorly measured and at the present time least predictable is the loss from disease. It is well known, however, that the losses from certain diseases vary much more widely from year to year than do others. Among those that fluctuate in severity are late blight of potatoes, brown rot of peaches, and scab of apples. The estimated losses from these diseases during the decade

Among the hazards that must be faced in the production of many of our major crops, one of the most poorly measured and at the present

1920-1929 are indicated in the accompanying graphs. These curves are based on estimates sent in annually to the plant disease survey of the Bureau of Plant Industry by collaborators situated throughout the United States. These losses are always expressed in percentages of crop or in terms of bushels per acre, never in dollars, because of the complex economic factors involved. In many cases, perhaps in most, the figures furnished by collaborators are estimates in the true sense of the word; that is, they are not the result of counts or calculations, but are based on general field observations. They are made, however, by careful and experienced field observers and are the most trustworthy figures available.

In making up the percentage of loss for the United States the figures for the individual States are first reduced to bushels or other units and summed to obtain the total loss for the whole country. The percentage is then computed on the assumption that 100 per cent is the total actual production plus the estimated losses from all diseases of the crop.

As shown in Figure 97, the loss from brown rot of peaches, considered on a national basis, was almost 12 per cent in 1920, fell to less than 3 per cent in 1923, and less than 2 per cent in 1925, rose again to over 10 per cent in 1928, and dropped to less than 5 per cent in 1929. Apple scab (fig. 98) showed a loss of over 12 per cent in 1922, over 9 per cent in 1924 and 1928, and less than 4 per cent in 1923, 1925, and 1926.

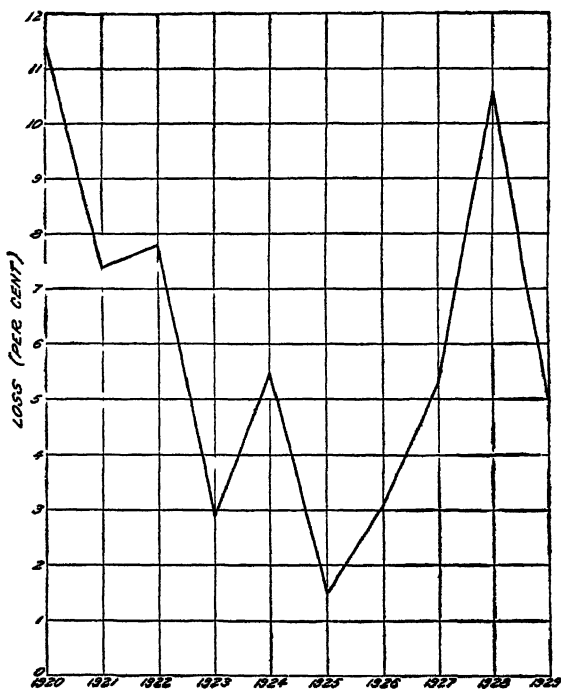


FIGURE 97 —Estimated losses from brown rot of peach in the United States, 1920-1929

### Fluctuation in Loss From Late Blight

To an observer in the United States for the first time in 1923, late blight of potato might have appeared to be a minor disease, for the estimated loss that year was less than 0.2 per cent. (Fig. 99.) In 1921 and 1929 the loss from this disease was estimated at less than 1 per cent. In 1920, on the other hand, the estimated loss from this disease alone was 8 per cent of the total crop, and in 1926 and 1928 it reached approximately 7 and 6 per cent, respectively.

All the causes of loss thus far discussed are well-recognized diseases, caused in each case by a single organism. Sometimes, however, as in

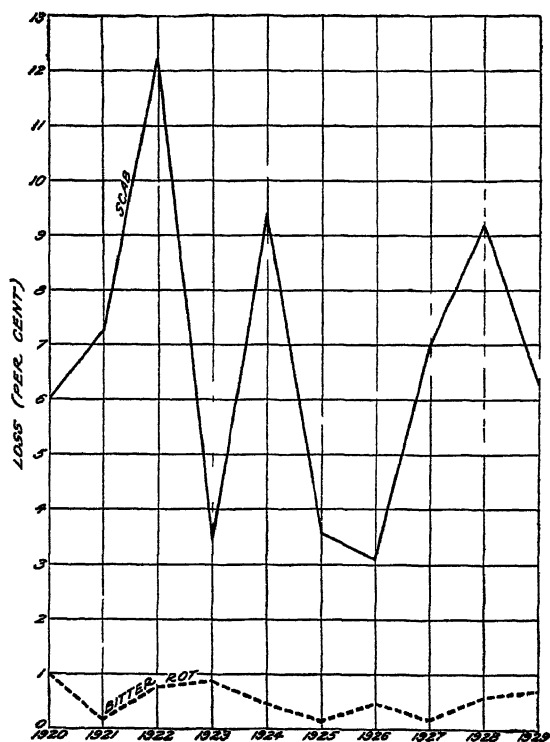


FIGURE 98—Estimated losses from scab and bitter rot of apple in the United States, 1920-1929

fluctuate in the same way as do those mentioned. Some, such as bitter rot of apples and blackleg of potatoes, when considered on a national basis, remain a continual and comparatively steady drain on the production of the crop. (Figs. 98 and 99.)

Although these losses are expressed in terms of percentage loss for the entire United States, the loss from any disease is of course far from falling equally on all producing sections. In the United States the region of greatest severity of potato late blight includes the New England States, New York, and Pennsylvania. Apple scab is more severe in the northern than in the

storage rots, it is not easy to separate the amount of loss due to each fungus without special study, and for purposes of estimate they are therefore grouped together. Such a group, however, may show decided variation as a whole. This is the case with storage rots of sweet potato, which have been made the subject of much careful study. (Fig. 100.) From a maximum of 23 per cent in 1920, the estimated loss from these diseases fell steadily to less than 10 per cent in 1923, 1924, and 1925, since which time it has risen somewhat, reaching almost 15 per cent in 1928.

Of course not all the diseases of apples, potatoes, or peaches

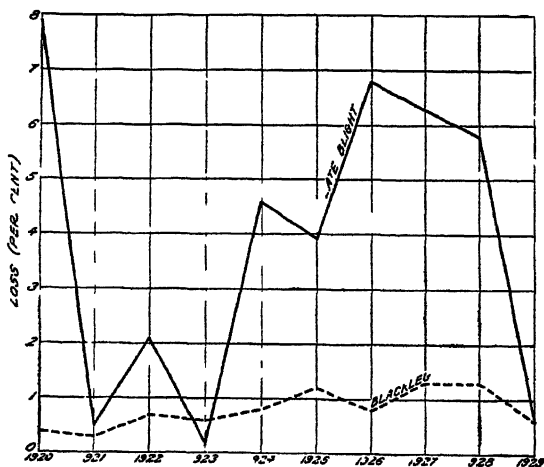


FIGURE 99—Estimated losses from late blight and blackleg of potato in the United States, 1920-1929

southern part of the United States, while brown rot is especially severe in the peach-growing districts of the Atlantic coast from New Jersey southward.

### Some Controlling Factors Known

Some of the factors that influence the prevalence of plant diseases are well known. Unusual abundance of potato late blight, peach brown rot, and apple scab is closely associated with timely or abundant rainfall. On the other hand, the fluctuation in the amount of loss from storage rots of sweet-potatoes seems more probably to be due to increase and decrease in the care with which control measures are carried out.

It is obvious that there are occasional seasons when the incidence of certain common diseases is so slight there is little advantage in control practices. A succession of such seasons often tends to carelessness and a general relaxing in control measures, with the result that losses from disease are even greater when the next bad year arrives. If disease-free years could be accurately predicted it might be possible to save money by omitting sprays in those years. Such predictions, however, must be far in the future, even if they are ever possible, and at present the only safe rule is "to keep everlastingly at it."

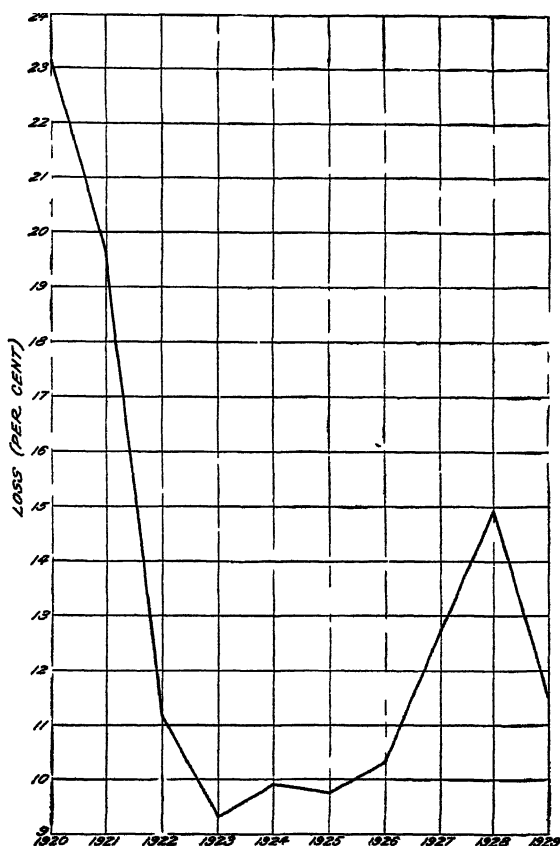


FIGURE 100 —Estimated losses from storage rots of sweetpotato in the United States, 1920-1929

NEIL E. STEVENS, *Bureau of Plant Industry.*

**P**LANT Explorers Bring Valuable New Species and Varieties to U. S. Keeping step with America's changing and expanding agriculture, recent exploration activities of the Department of Agriculture have brought back many diverse plant contributions from widely separated parts of the globe. Agricultural exploration has two objectives: (1) The intro-

duction of new and noncompetitive crops, both orchard and field, as an aid to the diversification of American agriculture; and (2) the introduction of varieties of crops and trees already grown in the United States which may be more resistant to disease and insect pests or to climatic extremes, thereby increasing unit yields per acre and reducing costs of production.

### Extensive Exploration for Soybean Varieties

The soybean is a crop whose commercial development in the United States has been a phenomenon of the last 15 to 20 years. The success of this introduced legume throughout a wide area in the Middle West has led to a demand for varieties suited to other parts of the country.

In the spring of 1931 P. H. Dorsett, of the Division of Foreign Plant Introduction, and W. J. Morse, of the Division of Forage Crops and Diseases, returned from the Orient after a search of more than two

years for new varieties of soybeans. Their travels took them to Japan, including Hokkaido, the northernmost island, and the peninsula of Saghalin, to Manchuria, Chosen (Korea), and China. Almost 3,000 soybean varieties were obtained in these great soy-producing areas.

Special attention was also paid to other legumes of possible value to American agriculture, and important collections of mung beans, lespedeza, alfalfa,



FIGURE 101—Methods of transporting the oriental persimmon were investigated by the Dorsett-Morse expedition

and Melilotus varieties were made. Other valuable field-crop introductions resulting from this expedition include collections of barleys, wheats, and grasses.

A number of valuable horticultural contributions were also obtained. A special study was made of the oriental persimmon and about 200 introductions were made from Japan, China, and Chosen. (Fig. 101.) In Peiping the expedition discovered the fruit being processed on a large scale to remove astringency, and made a thorough study of the methods used. Investigations of the outdoor storage of this fruit, begun during a previous expedition, were continued.

Numerous berries and *Prunus* species were included in the fruit collections made. New varieties of the oriental flowering cherry, rhododendrons, azaleas, lilies, and many other ornamental and flowering plants were procured. Different types of melons and vegetables completed the horticultural introductions; these are primarily for the use of plant breeders.

### Blight-Resistant Chestnut Sought in Far East

In the fall of 1930 another important expedition in the Far East was terminated. R. Kent Beattie, of the Division of Forest Pathology, returned to the United States after a period of almost three years spent

in searching for chestnuts and chestnut relatives that might be resistant to chestnut blight and be used to replace the native chestnut wiped out by this disease in the eastern United States. His search led him throughout Japan, including the comparatively little-known island of Taiwan (Formosa), the mountain ranges of Chosen, and the hill country of China, while on the return trip stops were made in southeastern Asia. His explorations resulted in procuring scions of 90 cultivated varieties of chestnut and a total of 250 bushels of seed of many other types. At the present time seedlings are being grown by foresters and experiment station workers from Louisiana to Michigan west of the Alleghenies, and from Alabama to Connecticut on the Atlantic seaboard.

The areas covered in the search for chestnut varieties were also rich in rhododendron and azalea species and varieties, and seed of many of these was also obtained. Some of the seedlings are already being used for hybridizing by department workers for the development of improved types for American gardens.

### Blight-Resistant Alfalfas and New Fruits from Asia

The spread of bacterial blight of alfalfa has taken heavy annual toll throughout the United States, particularly in the Middle West. It has made the development of blight-resistant strains imperative if this crop is to continue to be profitable in many sections. A study of old alfalfa plantings indicated that some types, grown from seed originally coming from Turkestan, were apparently immune. Accordingly, in 1929 H. L. Westover, of the Division of Forage Crops and Diseases, went to Russian Turkestan and neighboring parts of eastern Europe to hunt for resistant alfalfa types. (Fig. 102.) Because of the opportunities for procuring new varieties of fruits, nuts, and melons from this relatively isolated part of the world, W. E. Whitehouse, of the Division of Foreign Plant Introduction, accompanied Mr. Westover and later continued on into Persia. The scattered and hardly accessible alfalfa-growing districts of the Turkestan deserts and mountain regions yielded many types of alfalfa together with other legumes, cereals, and grasses. These are now under trial by department specialists.

A number of interesting introductions of importance from a horticultural point of view were made. Melon collections were obtained in both Turkestan and Persia and are being used in the selection and breeding of disease-resistant strains in the United States. Collections of wild apricots, pears, apples, and the pistache nut were made in the mountainous regions of Turkestan near the Chinese frontier. The principal pistache-growing areas in Persia were visited and seed and scions of the best types were collected. Several hundred seedlings of



FIGURE 102 —The Westover-Whitehouse expedition seeking alfalfas and fruits in the mountainous region of southern Turkestan

the best Persian varieties of this nut are now being grown as a basis of selection for large-fruited types for the Southwest. This expedition returned in December, 1929.

### Disease-Resistant Wheat and Barley Varieties

In the early years of the present century Russia yielded the hard or durum wheats that have become such an important factor in our great wheat-growing States. Varieties of other cereals—barley, oats, and rye—introduced about the same time, have also contributed extensively to our national farm returns. After many years, attention has again been turned to Russia in connection with cereal problems. The annual losses sustained in the United States through cereal diseases are tremendous. The material reduction of these losses would greatly decrease our cost of production and permit more successful competition in world markets. To study cereal diseases in the great grain-growing areas of Russia and, if possible, to locate varieties of wheat and barley more resistant to disease than those we now have, James G. Dickson, cereal pathologist of the University of Wisconsin and agent of the United States Department of Agriculture, was sent to Russia in 1930. His travels took him from Moscow to Transcaucasia, formerly Armenia, and from the eastern to the western frontier of European Russia. New strains were studied in the field and at the numerous large experiment stations where thousands of varieties are now under trial. Wild types were sought in the mountainous region of the Caucasus. From all these sources many promising strains and varieties were collected.

### Alfalfa and Fruit Varieties

Resuming the search for blight-resistant alfalfa, begun in the summer of 1930, H. L. Westover undertook to explore Spain and north African countries for alfalfa and other forage crops, while K. A. Ryerson of the Division of Foreign Plant Introduction sought citrus and deciduous fruit varieties and other shrubs and trees valuable to American horticulture. Together they crossed north Africa from Morocco to Tunis and return, visiting desert oases and Berber settlements in the Atlas Mountains (fig. 103) and securing seed of indigenous types of both forage crops and fruits of promise. In Spain Mr. Westover spent three months visiting all the important alfalfa-growing areas and in addition hunted wild types in the Pyrenees and in the Sierra Nevada of Granada. As a result, over 300 alfalfa introductions were obtained, together with numerous other legumes and grasses.

Earlier in 1930, in cooperation with the University of California, F. T. Bioletti, grape specialist, was sent as an explorer to Morocco, Algeria, and Tunis to study and collect indigenous types of grapes, especially those that would mature earlier than the kinds now grown in this country and would be superior for table use. Such grapes would be of special value in the irrigated desert areas of the Southwest. He also investigated and collected indigenous varieties of the apricot. As a result of this expedition, important collections of grapes were obtained and are now under trial at State and Federal stations in California, and a large number of native apricot seedlings are being grown for selection studies.

During the winter of 1929-30 H. S. Fawcett, pathologist of the California Citrus Experiment Station, was engaged in studies of citrus

and date diseases of the Mediterranean region in cooperation with the United States Department of Agriculture. As a part of these investigations, citrus varieties not now grown in the United States were selected in the different countries and sent back for rootstock studies and breeding investigations.

### Survey in Islands of the Mediterranean

In addition to the extensive explorations carried on in the western Mediterranean during the summer of 1930, a short survey of the eastern Mediterranean area, particularly the islands of the Aegean, was made by David Fairchild of the Division of Foreign Plant Introduction. With the facilities of the steamer *Utorwana*, which had already served several department expeditions through the courtesy of Allison V. Armour, collaborator of the Division of Foreign Plant Introduction,



FIGURE 103—Berber villages in the Atlas Mountains of northern Africa, where alfalfa varieties were sought

many of the islands off the regular steamer routes were visited and studied from the point of view of possible future intensive exploration for valuable plants. The route, which included the Dalmatian coast, extended as far east as Istanbul and yielded much valuable data on relatively little-frequented areas and a number of promising plant introductions.

### Latin America a Fertile Field

In common with the alfalfa and cereal industries, the potato industry has been widely affected by the spread of serious diseases of fungus as well as virus origin. Breeding investigations have been under way at State and Federal stations for the development of resistant varieties. To further these activities, wild types of the potato from their habitats in Central America and South America have been found necessary. To meet this need Paul Russell and Max Souviron of the Division of Foreign Plant Introduction were sent to Mexico in the summer of 1930. In the fall Donald Reddick of Cornell University and C. O. Erlanson of the Division of Foreign Plant Introduction followed. The work continued until the beginning of 1931 and was centered in the States of

Mexico, Puebla, Morelos, Hidalgo, Queretaro, Oaxaca, and Vera Cruz. Seventy lots of tuber-bearing *Solanums* of several species were found and seed and tubers brought back for propagation and distribution to potato breeders in State and Federal stations. It is planned to continue similar studies in South America until all desirable wild species have been made available.

### A Promising Fiber Plant for Porto Rico

Limited tests of the Mexican pochote tree (*Ceiba acuminata*) in Porto Rico have indicated that it might be a source of valuable fiber if trees yielding good crops of high-quality fiber could be introduced. On the completion of the potato activities in Mexico, early in 1931 Souviron and Erlanson explored the States of Sonora, Sinaloa, Jalisco, and Chiapas, and collected quantities of seed from the best trees. A quite different type was found in the extreme southern State of Chiapas. Excellent germination has been obtained in Porto Rico, and a sufficient quantity of seedlings has resulted from the planting to give a thorough test of the tree as a source of valuable fiber.

### Primitive Relatives of Cotton and Corn Discovered

Certain of the primitive relatives of cotton and corn have long been desired by department investigators in connection with the improvement of these crops through breeding. These species are not easily accessible, their habitat being along the isolated coastal regions of Mexico and Central America remote from centers of civilization. Through the generous offer of Allison V. Armour, it was possible for G. N. Collins and J. H. Kempton of the Division of Genetics and Biophysics, and T. H. Kearney of the Division of Egyptian Cotton Breeding, to visit this coastal region in the early part of 1931 on the steamship *Utowana* and to collect all of the special species desired. In addition, Doctor Collins collected a quantity of avocado seed from a high region of Guatemala where frost regularly occurs. These will be used for selection studies in an effort to develop hardier varieties of this fruit than are now available.

### Ornamental and Flowering Plants

The field of ornamental trees and shrubs and flowering plants is probably the most rapidly developing branch of American horticulture at the present time. The American people are going in for home gardening in a manner unheard of a few years ago. As a result, the demand for new and interesting ornamentals has become very strong. In order to profit by recent developments in this field in Europe and to secure some of the results of explorations for this type of plant material by European explorers, B. Y. Morrison of the Division of Foreign Plant Introduction spent several months during the spring and summer of 1931 in European countries. The new developments of plant breeders were studied, as well as the new introductions from explorations and the private and public collections of rare plants. From the best of these, selections were made for introduction and use in the United States.

KNOWLES A. RYERSON, *Bureau of Plant Industry.*

# PORK Loins, When Seared, Shrink More in Weight Though Cooking Faster

"Sear the roast in a hot oven" is old-time, cook-book advice founded on the belief that searing decreased the cooking losses. The truth of this

statement has wanted proof and has, in fact, been contradicted in recent work on beef, done by the United States Department of Agriculture and the Missouri Agricultural Experiment Station, participants in the national project—cooperative meat investigations. In order to determine what effect searing would produce on pork, a short study was made in which eight pairs of pork loins were roasted, one member of each with searing and one without. The cut included eight vertebrae from near the center of the loin.

The thickness of the fat layer covering the loins varied considerably owing to lack of uniformity in their trimming. To compensate for effects associated with this difference in fat layer, the loins were so divided as to balance the seared and unseared groups in this respect. Also to counteract possible differences in the two sides of the animals, each group included four right and four left loins.

In measured quantities, 1 teaspoon flour, one-half teaspoon salt, and one-eighth teaspoon pepper were rubbed into each roast. A roast-meat thermometer was inserted in the loin end of the roast, which was the thickest part. The uncooked roasts and their containers were then weighed.

One loin of each of these eight pairs was cooked in an open pan at a constant oven temperature of 320° F. (160° C.), until the meat thermometer registered 183° F. (84° C.) as the internal temperature of the roast. The corresponding loin of each pair was seared for 30 minutes at an oven temperature of 482° F. (250° C.), weighed, and then cooked in an open pan at an oven temperature of 320° F. until the meat thermometer registered 183° F. All the roasts were weighed at the end of the cooking period, as were also the drippings which had collected in the pans. The total loss of weight in the oven (the difference in weight between the raw and the finished sample) was divided into two parts: (1) Loss of volatile constituents (mostly water) by evaporation, and (2) loss of nonvolatile constituents, or drippings. The drippings consisted of fat and an unanalyzed brown essence, but the drippings are treated here as a whole.

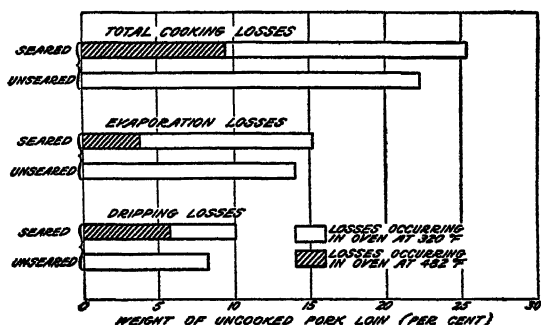


FIGURE 104—Cooking losses of seared compared with unseared pork loins

## Method of Reckoning Cooking Losses

Total cooking losses, evaporation losses, and dripping losses for the searing periods, as well as for the entire cooking periods, were calculated as percentages of the raw weights of the roasts. Each of these factors was then averaged for both the seared and the unseared groups.

The average cooking losses for corresponding seared and unseared roasts are shown in Figure 104. The portion of the losses occurring in the searing oven is indicated by crosshatching (shading) on the bars representing the total cooking losses, the evaporation, and the drippings. The seared roasts lost relatively more in evaporation and drippings and consequently in total cooking than the unseared roasts.

As would be expected, the roasts that were seared cooked more quickly than those cooked throughout at the constant temperature used. The former took 29 minutes to the pound on the average as compared with 34 minutes to the pound for the corresponding unseared loins.

The general appearance of the roasts which had been seared was somewhat better than that of the unseared roasts, the color being a richer brown, but in some cases the drippings from the seared loins were rather dark for gravy of good color.

These results suggest that searing pork-loin roasts by the method used here improves the general appearance and saves time in cooking but does not decrease the cooking losses. In fact, the cooking losses are increased with searing. This increase appears to be due mainly to the rendering out of more fat into the drippings. These results indicate that pork loin can be successfully roasted, without searing, at a constant, moderate, oven temperature of from 320° to 350° F.

NANCY GRISWOLD CLARK, *Bureau of Animal Industry.*

**P****O****T****A****T****O** Seed Quality Improved by Tuber-Index Method of Selection The improvement of the quality of seed potatoes through selective methods has long engaged the attention of the investigator as well as that of the progressive potato grower. As a natural result of such study, various methods have been evolved having for their object the selection of strains producing tubers of greater uniformity in size and shape and at the same time of greater yielding capacity. The successive steps in this evolution have been as follows:

(1) Mass selection of tubers either from the bin or from individually selected plants harvested separately and then thrown together and planted in a seed plot. (2) Hill selection, consisting of the selection of superior looking plants, followed by a second selection, when the plants are harvested, based on yield and uniformity of tubers. The tubers from each selected plant are kept separate and planted in progeny rows. (3) The tuber-unit method, by which each individual tuber from either mass selection or hill selection is cut into four parts, which are planted consecutively in the row.

These methods had as their primary object the isolation of promising strains of seed. In most cases, however, they accomplished another object oftentimes not premeditated by the investigator, namely, elimination of disease.

With the increasing importance of virus diseases as an obstacle to the production of certified seed potatoes, a more certain means of eliminating tuber-borne diseases has become necessary, and as a result the tuber-index method<sup>2</sup> has been evolved. Briefly stated, this method consists in removing and growing a seed piece from each individually numbered tuber selected from some given stock from which it

<sup>2</sup>The tuber-index method was first employed by F. M. Blodgett and associates of Cornell University, Ithaca, N. Y., during the season of 1919 and also during the winter of 1919-20.

is desired to eliminate as far as possible all tuber-borne diseases, especially those of a virus nature. (Fig. 105.) During the early stages of their growth the plants produced from these individual seed pieces are carefully observed for the presence of mosaic and other virus diseases. As each plant carries the number of the tuber from which the seed piece was removed, it is easy to discard the diseased tuber. All tubers from which the tested seed piece produced a healthy plant are used in the planting of a well-isolated seed plot. Usually they are planted on the tuber-unit basis in order to make it easier to detect the presence of any diseased ones that may have escaped observation in the preliminary test

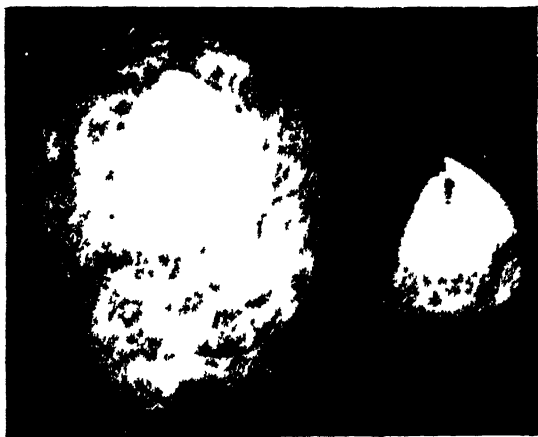


FIGURE 105 —Method of removing seed piece from potato tuber to determine presence or absence of disease. The small seed piece is either potted or planted out and grown for observation

### Two Ways of Applying the Method

It is possible to take advantage of this method of tuber-disease detection under two distinct conditions. The first is that of potting the seed pieces into 4 or 5 inch pots and growing them in the greenhouse. By this practice it is possible to carry through several sets of

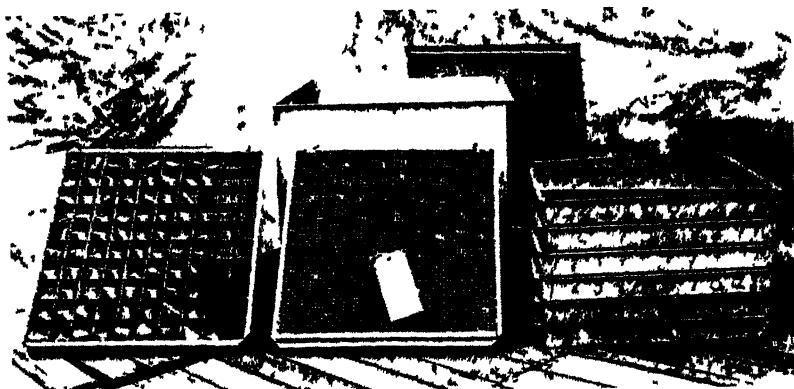


FIGURE 106 —Method of germinating successive lots of potato seed pieces in trays. This method increases the capacity when greenhouse space is limited. The seed pieces are covered with sand or soil (Photograph furnished by H. O. Werner, Nebraska Agricultural Experiment Station)

plants in the same bench space during the winter months. Growers following this practice and utilizing their greenhouse space to the best possible advantage are resorting to chemical treatment of the seed pieces to hasten germination. In this way it is possible to begin tuber-index studies shortly after the tubers are harvested.

Tuber indexing seed-potato stocks in advance of date of planting has now become a precertification requirement in some States. Where such conditions are imposed on the would-be grower of certified seed he is obliged to submit a representative sample of his seed stock for indexing by those in charge of the certification work. If the test shows the presence of too large a percentage of disease he is advised to discard it and purchase some recommended stock.

The Wisconsin, Minnesota, Nebraska, and Montana Agricultural Experiment Stations are making most extensive use of the greenhouse for tuber-index studies. (Figs. 106 and 107.)

The second condition under which tuber indexing may be conducted is that of planting the removed seed pieces in the open field. Such indexing may be conducted in all regions where first and second early potato crops can be grown; roughly speaking, from southern New Jersey to Florida and southwest to the Pacific coast.



FIGURE 107—Germinated potato seed pieces removed from trays prior to being potted or planted in benches (Photograph furnished by H. O. Werner, Nebraska Agricultural Experiment Station)

Most of the States engaged in greenhouse tuber-index work have taken advantage of the field-indexing of seed stock by shipping samples of seed to the South and making their disease readings at some propitious time during the growing season. During the winters of 1929-30 and 1930-31 the Division of Horticultural Crops and Diseases has indexed many thousands of tubers in the South.

#### Readings Dependent on Climatic Conditions

Satisfactory outdoor disease readings are largely dependent on climatic conditions. If the weather and soil conditions are favorable much more accurate observations are possible than if reverse conditions prevail. Field indexing has an advantage over greenhouse studies in that it is possible to test large numbers of tubers at a relatively low cost and to continue the observations throughout the full growing period of the plants, thus making the detection and elimination of the spindle-tuber disease more certain.

Until varieties resistant or immune to virus diseases have been developed, the tuber-index method offers the most reliable known means of eliminating tuber-borne diseases.

WILLIAM STUART, *Bureau of Plant Industry.*

## POULTRY Experiments Show Value of Alfalfa Meals in Chick Ration

The number of poultry in the United States has increased greatly in the last decade, and with the increase have come many new problems in management. Formerly, most poultry were kept as a sideline on general farms and usually compelled to forage for feed. Under the free-range conditions generally used, sufficient green feed was available except during the winter.

An entirely different situation exists to-day. Numerous farms are devoted entirely to poultry keeping, and the tendency is to confine the birds to limited areas. When a bare range is provided, or when battery brooding or the confinement method of management is used, it is usually advantageous to supply fresh green feed or a green-feed substitute.

In view of the recognized importance of vitamins in nutrition, much emphasis has been placed on the vitamin content of feedstuffs. The necessity for some source of vitamin A in a ration for chicks is illus-

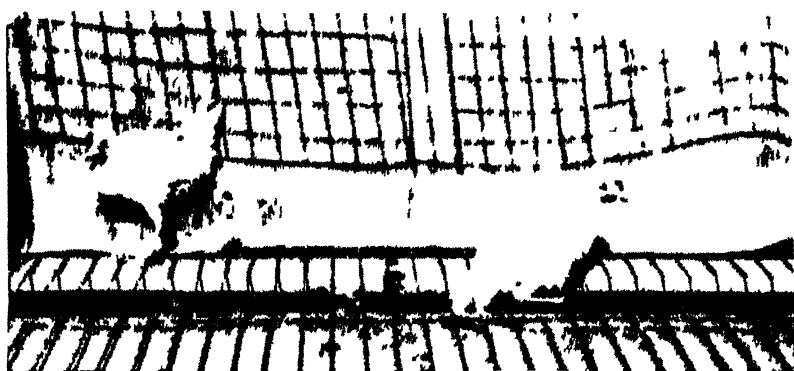


FIGURE 108—Chickens 20 weeks old which had received a ration deficient in vitamin A

trated in the accompanying photographs taken at the United States Poultry Experiment Station, Glendale, Ariz. The chickens were all 20 weeks old when the photographs were taken. The two chickens in Figure 108 were the survivors of a group of 38 which had been fed a basal ration deficient in vitamin A. In Figure 109 are shown 5 chickens from a group which had been fed the same deficient basal ration, plus fresh alfalfa. The mortality in this group receiving fresh alfalfa was slight and, as illustrated, the growth of these chickens was much greater than that of the group which received only the basal ration.

### Kinds of Alfalfa Meals

When poultry are raised under intensive conditions it is often not possible to furnish them with fresh green feed, even during the summer. The inclusion, in the mash, of meals made from the alfalfa plant is becoming popular and several investigators have demonstrated that meals made from the fresh entire alfalfa plant, alfalfa leaves, and alfalfa hay can be used advantageously in rations for laying hens. Few trials have been conducted in which those products were compared in the rations of young chickens.

Meals made from alfalfa are commonly recommended as a part of poultry rations, but usually not enough emphasis has been placed upon the differences which may exist among different meals. Rain damage and improper curing are often indicated by a loss of green coloring matter. Meals which have been damaged in such ways usually are yellowish in color. The age of a meal also is often indicated by its color, since the green coloring matter changes to a yellowish green as the meal becomes older. In general, two kinds of meal are made from alfalfa. One, called alfalfa meal, is made from the entire harvested plant; the other, called alfalfa-leaf meal or alfalfa leaf and blossom meal, contains more leaves and fewer stems. Alfalfa meals have lower protein and higher fiber contents than the alfalfa-leaf meals or the alfalfa leaf and blossom meals.



FIGURE 109—Chickens 20 weeks old which had received a ration deficient in vitamin A, plus fresh alfalfa

A series of experiments was conducted at the United States Poultry Experiment Station to compare alfalfa meal, alfalfa-leaf meal, and fresh alfalfa as sources of vitamin A in a ration for chicks. The basal ration used was deficient in vitamin A, and measured amounts of the different supplements were used for different groups. In the trials, fresh alfalfa was found to be superior to either alfalfa meal or alfalfa-leaf meal when used as the sole source of vitamin A.

Inasmuch as it is often not possible or practicable to feed fresh alfalfa to growing chicks, the most applicable comparisons were those between the groups receiving alfalfa-leaf meal and the groups receiving alfalfa meal. Growth and livability of the chicks were the bases for comparisons, and the alfalfa-leaf meal gave much better results than the alfalfa meal. In fact, the alfalfa meal was practically valueless with the basal ration used.

#### Suggested Quantities in Rations

In accordance with the results obtained, it can be recommended that fresh alfalfa be fed to chicks whenever it is available, and that alfalfa-leaf meal, preferably with a rich green color, be used as a source of vitamin A when fresh alfalfa can not be obtained.

How much alfalfa-leaf meal should be used in a ration for chicks? The proper quantity will vary in proportion to the quantity of other sources of vitamin A in the ration. When other good vitamin A sources, such as yellow corn, are used freely, as little as 2.5 per cent may be used. In other rations, from 5 to 7.5 per cent of the mash ration should be alfalfa-leaf meal. In rations in which alfalfa-leaf meal is the only source of vitamin A, this meal should constitute about 10 per cent of the total food intake.

The manufacture of dehydrated alfalfa meals is becoming more extensive. Briefly, the methods used consist in removing the moisture from fresh alfalfa soon after it is cut. Thus far, it has not been demonstrated that dehydrated meals are of more value in poultry rations than meals made from sun-cured alfalfa hay in sections where rain does not interfere with curing. Further experimental data must be obtained before any definite statements about the value of dehydrated alfalfa meals in poultry feeding can be made.

BURT W. HEYWANG, *Bureau of Animal Industry.*

**P**OULTRY Lice Cause Heavy Losses Which Are Wholly Preventable That poultry lice curtail production and profits is generally admitted. The extent of loss naturally depends on the degree of infestation. Probably a few lice do little harm to mature poultry, but a few lice may soon become many lice, and young birds are more susceptible to louse attack than are mature ones. Some experiments carried out by the Bureau of Entomology a few years ago indicate that a moderately heavy infestation may cut egg production 15 per cent. That means a loss of millions of dollars to the poultry owners of this country. This loss is wholly preventable, and at low cost.

Many progressive commercial poultry raisers eliminate lice from their flocks or hold them under control. The owners of farm and back-yard flocks, however, usually pay little attention to these parasites, but continue to feed thousands of them year in and year out.

There are five different kinds of lice commonly found on chickens. These have somewhat different habits and some are more injurious than others. They have been given common names which indicate the part of the bird or its feathers, which they inhabit. The head louse is found principally on the head and neck and is the most injurious to young chicks and poultry. The body louse spends most of its life on the skin of mature chickens. It prefers places where the feathers are not too dense, such as below the vent, but on half-grown chickens it may be found in abundance on the back and neck. This louse infests turkeys and other fowls as well as chickens. It is one of the most widespread and injurious species. The shaft louse is present on different parts of the host, but is nearly always seen on the shaft of the body feathers. The wing louse is found mainly on the large wing feathers, but also occurs on the tail and neck feathers. It is less injurious than the species previously named. This is also true of the fluff louse, a slow-moving species which is usually found on the fluffy feathers of the body. Other kinds of lice are found on turkeys, geese, pigeons, and other fowls and birds.

## All Species Yield to Sodium Fluoride

Fortunately for the poultry raiser all these different kinds of lice can be destroyed by the treatment developed and recommended by the Bureau of Entomology—namely, the use of commercial sodium fluoride. This powder may be applied either as a dust or as a dip.

In using it as a dust the "pinch method" is advised. This consists simply of putting about 12 pinches of the powder, as held between the thumb and forefinger, next to the skin on different parts of each bird.

The head, neck, back, breast, the part beneath the vent, the wings, and tail should each be treated.

Where more than 35 fowls are involved the dipping method is advised. A bright, warm day should be chosen for the work. The sodium fluoride is dissolved in water in the proportion of a heaping tablespoonful to each gallon. A tub is well filled with this solution and each bird is immersed for a few seconds. The bird is held in the dip by the wings with one hand, while with the other the feathers are raised to allow the solution to reach the skin. The head is ducked for an instant.

By either of these methods every louse and egg is killed. Thus by a single treatment of every fowl on the premises the lice may be eradicated. (Fig. 110.) The cost for ma-



FIGURE 110—A single dipping of a fowl in sodium fluoride solution will kill all lice

terial is but a fraction of a cent per bird, as 1 pound of sodium fluoride will treat 100 hens by the pinch method and 200 by dipping.

Other materials may be used for combating poultry lice, but considering effectiveness, cost, and availability, sodium fluoride is recommended.

F. C. BISHOPP, *Bureau of Entomology.*

## POULTRY Raising on a Very Intensive Scale Is Proving Practical

The keeping of large numbers of chickens on one farm has developed to such an extent in this country that there are now battery brooding plants which will accommodate many thousand chicks, laying houses with quarters for several thousand hens, and poultry farms of from 10,000 to 25,000 hen capacity. Much of the intensification has developed in the last few years since the use of cod-liver oil in the ration has enabled poultry men to keep both chickens and hens confined indoors without loss of vigor or health.

Brooding chicks in batteries, especially for the production of broilers, is the branch of this work which has been most intensively developed in recent years. Many types and sizes of batteries are in use, from small batteries holding 200 to 300 chicks to large units holding several thousand birds. All these batteries have wire floors which prevent the chickens from eating their droppings. This feature is important especially in the prevention and control of disease. Batteries are now operated in insulated rooms where the temperature, humidity, and ventilation are all artificially controlled so that uniform conditions may be maintained regardless of changes in the weather.

#### Sanitary Safeguards Are Features of the System

The use of battery brooders is advised for raising broilers and for raising all chicks where the soil is infected with disease germs. They are being used successfully on many farms for starting chicks even where there is no trouble with infected soil. Turkey poults are also brooded successfully in batteries. Long brooder houses in which the chicks are raised on the floors and which have small, outside, covered yards with either concrete, gravel, or wire bottoms, are also used successfully. Keeping the chicks away from the soil and giving careful attention to sanitation are important features in these methods of brooding.

Chickens that are to be kept longer than from 12 to 14 weeks will do much better and require less care if transferred to a clean range as soon as they no longer need artificial heat. The use of a cheap, portable, range shelter, made with a very low roof and wired sides and floor, is one of the recent improvements in the raising of good pullets. Even in producing broilers many poultry men start the chicks in the batteries, transfer them to brooder-house pens when they are from 6 to 8 weeks old, and then put them in fattening batteries for two or three weeks before the broilers are marketed.

Chickens that are brooded in large numbers indoors require very careful management. Deformed and twisted legs are common defects in chicks raised in battery brooders and these defects are not prevented by the use of cod-liver oil. This department has found, however, that the use of 10 per cent of rice bran in the ration is very helpful in growing battery-brooder chicks free from leg trouble. Reducing the amount of corn meal and increasing the wheat bran in the ration have helped in some cases to prevent leg trouble and also to cause better feather growth.

Overcrowding is the cause of much loss in battery brooding, since batteries large enough for starting the chicks become greatly overcrowded after the chicks are a few weeks old. The fact that a chick triples in weight between 4 and 8 weeks of age makes it easy to understand why overcrowding is a common trouble in battery brooding. Chicks often pick one another when in these batteries, causing heavy losses in the brooder as well as poor quality in the market chickens. Keeping the brooder houses slightly dark and using ruby-colored lights in the pens have been reported as being helpful in preventing this trouble.

#### Multiple-Story Laying Houses

Laying houses from two to six stories in height, with a capacity of several thousand hens, have replaced the common type of long single-

story houses on a number of poultry farms. The birds are kept confined in these large houses and are never on the ground after they go into the houses as pullets in the fall. Since hens on large poultry farms are usually confined most of the year even in 1-story houses, larger houses do not involve any radical change in management. Cod-liver oil is used in the ration to insure an adequate supply of vitamin A and the sunshine vitamin, D. The windows are arranged to allow the maximum amount of sunlight to shine directly into the house. These large houses reduce labor costs, and the birds are less affected by changes in the weather than they would be in small houses. In many cases large barns (fig. 111) have been remodeled into multiple-story laying houses.

The successful management of these apartment poultry houses requires close observation since even slight neglect may result in heavy losses in the flock.



FIGURE 111.—Dairy barn remodeled into a large, 6-story poultry house

The ration must contain all the essential ingredients, properly balanced, because the hens have no chance to supplement their feed with greens, minerals, or grain commonly found on range. In one of the department's experiments the use of a slightly deficient diet gave fairly good egg production with hens on

range, while the same ration fed to hens confined to the house produced only a few eggs per hen.

Ventilation of a large poultry house requires the use of a mechanical ventilating system. Many of the houses are insulated and heat is being provided in some. All large poultry houses must be kept absolutely clean and sanitary. These large hen houses probably will increase in number as more information is obtained on feeding the hens, on ventilating and heating the buildings, and on the control of picking which has been a cause of much loss where hens are confined.

ALFRED R. LEE, *Bureau of Animal Industry.*

**P**REDATORY-ANIMAL and Rodent Control to be Conducted Under a 10-year Program After working more than 15 years in the control of predatory animals and injurious rodents on the public domain and elsewhere in cooperative undertakings, the Bureau of Biological Survey has been authorized by Congress to conduct the work on a 10-year program. The new act, approved on March 2, 1931, will permit the bureau, when funds are provided, to do more effective work along lines already organized rather than to stimulate new lines of control. The law was passed only after careful consideration and public hearings, in which expression of divergent views was given by

many interested. Its passage should therefore set at rest any doubts that remain as to whether the control operations of the Biological Survey as now conducted deserve public approval.

Wolves, coyotes, mountain lions, and bobcats every year destroy large numbers of livestock and game, and the coyote at times also serves as a carrier of rabies, or hydrophobia. The economically injurious rodents, such as prairie dogs, ground squirrels, pocket gophers, jack rabbits, porcupines, rats, and field mice, not only destroy growing and stored crops, forest and other nursery stock, and much of the range grasses that should support the farming and livestock industries but in some cases also spread such diseases of man as spotted fever (by ground squirrels), tularemia (by rabbits), and bubonic plague (by rats and ground squirrels). Control of both groups of these economic wasters of the individual farmer's efforts is necessary in the interests of agriculture, horticulture, forestry, animal husbandry, and wild game.

The settler who saw the profits of his hard work wiped out by the incursions of predatory animals into his stock ranges, and of rodents into his cultivated fields, had no recourse other than to ask aid of the Government whose lands served as breeding reservoirs from which these destroyers kept coming. Uncontrolled, they would reinfest his stocked and cultivated acres in spite of all that he could do, either single handed or with the aid of his neighbors. To effect some measure of relief, he and his neighbors resorted to the use of steel traps, rifles, poisons, and trained dogs. The appeals they later made to the Federal Government for aid in suppressing predators and rodents on the public domain led to the first cooperative Federal efforts toward control.

### Many Bounty Laws Repealed

Prior to the Federal Government's entry into the cooperative control program, the desultory warfare against these animals had included the payment of bounties, a premium on the heads of the predators, to stimulate individual activity in their control. Bounty laws have continued in effect more or less to the present, though within the past 15 or 20 years many of them have been repealed, because it was found that they encouraged only sporadic efforts toward control and were productive of fraud. Since that time the steady growth of correlation of Federal, State, and local efforts has resulted in the development of more efficient control measures and, when such measures are applied, in increased safeguards for beneficial forms of wild life.

Since 1915 the leadership of the Bureau of Biological Survey in predator and rodent control has been requested and encouraged by State and other cooperating agencies, and the funds made available from such sources for expenditure under the direction of this Federal agency have in recent years been far in excess of those provided for the purpose from the National Treasury.

Research studies of the geographic distribution and relationships of the wild birds and mammals of the country, and field studies of their food and other habits, have been conducted by the Biological Survey for almost half a century, and these investigations have provided the basis of the control work carried on. Scientifically trained men are continuing research along these lines as funds permit, both in the field and in the laboratory.

The legal sanction for control work by the Federal Government is contained in congressional direction in annual appropriation acts for

the Department of Agriculture. These provide for investigations, experiments, demonstrations, and cooperation for the control of wild animals that become economically injurious, and for the suppression of rabies in predatory animals. The special program of control, which was called for by the Seventieth Congress, was authorized by the Seventy-first Congress as drawn up by the Department of Agriculture to cover a 10-year period.

### Federal, State, and Local Cooperation Provided

The 10-year program contemplates continued cooperation between Federal, State, and local agencies, with a view to avoiding duplication of work and insuring the largest possible return from such funds as are provided. The Bureau of Biological Survey will continue cooperation with the Office of Cooperative Extension Work, the extension-service organizations, including colleges and county agricultural agents, and with State departments of agriculture, county commissioners, game commissions, and various agricultural, horticultural, and livestock organizations. In the work on Federal lands, the 10-year program contemplates close cooperation with the Forest Service, the Indian Service, and with other agencies, as necessity arises.

There are at present more than 16,000,000 acres of rodent-infested lands within the national forests. The greater portion of these infested lands is thickly populated with prairie dogs and ground squirrels. Experiments and observations over a long period have demonstrated that prairie dogs will destroy from 20 to 80 per cent of the succulent forage grasses about their towns. The 10-year program contemplates, in cooperation with the Forest Service, a thorough control of rodents where it has been determined that they materially lessen production on forest grazing areas.

In many of the Eastern States also rodent-control work is necessary. The additional funds to be provided under the program will permit Biological Survey leadership in organized campaigns against such rodents as cotton rats in the South, pine mice and pocket gophers, and the common brown rat, which is probably the most destructive of all animals.

Within the past several years the coyote, one of the most persistent of the larger predators, has made its appearance in New York, Alabama, Georgia, Florida, Maryland, and Tennessee. From what source it has come is a moot question.

In Alabama, the coyote was introduced by fox hunters in mistake for fox pups, according to reports. In other instances possibly the source of infestation has been tourists returning from vacation lands in the western country and bringing young coyotes with them as pets. These in turn, escaping from their owners, revert to the wild and establish themselves in their new homes. In every case where the coyote has recently made its appearance in the East and South, complaints have been registered against its depredations, particularly on calves, sheep, hogs, and poultry.

In middle Tennessee, for instance, a petition for aid, signed by 18 farmers, showed a loss of 131 lambs, 56 ewes, and 1 goat. An expert hunter was assigned to this area under a cooperative agreement with Hickman and Maury Counties, and he succeeded in eliminating the demonstrated coyote infestation that was in existence, thus alleviating the loss these farmers had been sustaining.

The 10-year program contemplates control of predators on public domain to an extent that will reduce to the minimum the infestation on adjacent livestock-grazing areas. Under present conditions, such control is not possible because of reinvasions from a constantly renewed source of supply. Much has been accomplished during the last 15 years, but the degree of control that is desired has not been attained, and reinfestations of cleared areas are constantly occurring. The authorization of the 10-year program and provision of the funds contemplated should be an aid in more adequately controlling injurious mammals.

STANLEY P. YOUNG, *Bureau of Biological Survey.*

**R**ADIO Correlation Arranged by Federal and State Agencies Correlation of the information broadcasting of the Department of Agriculture and the State land-grant institutions, a development toward which the Radio Service has been looking for three years, became a reality during the last year and will be effective on a nation-wide scale during 1932.

Under the new system, information from the Department of Agriculture will be adapted and supplemented by the State extension services, which under the Smith-Lever Act of 1914 are operated by the land-grant colleges and universities. Thus, the information resources of the land-grant institutions and of the department will be pooled in order to bring out the most timely and useful information available, and information which will be of greatest interest to farm people in particular regions.

The plan for correlation had its inception in 1928, when the Radio Service was invited by the radio committee of the Association of Land Grant Colleges and Universities to cooperate in working out a system for correlating Federal and State broadcasting. At that time, it was proposed to correlate only the daily agricultural syndicate programs, which are sent in mimeographed form to individual stations upon request. The present plan is more inclusive. It contemplates State participation, also, in the network program of the department and in the home-economics syndicate service.

The general proposal for correlation of agricultural syndicate programs is that half of the material will be prepared by the department and half by the State extension services, to make a 15-minute, 6-days-a-week program. Naturally, the details of the proposal have been modified to meet varying conditions within States. The general proposal also contemplates that the material be supplemented by county extension agents, in order to give it the maximum local interest and adaptability. Also, that the program be presented by county extension agents whenever possible, thus providing authoritative speakers.

The home-economics syndicate service will be correlated in a similar way. The Housekeepers' Chats, which have been popular features on radio stations throughout the country for six years, will be sent to cooperating State extension services for adaptation and supplementing.

The proposal for State participation in the national farm and home hour—now broadcast over a network of 45 stations associated with the

National Broadcasting Co.—calls for setting aside a daily 5-minute period for the use of State extension services. At the end of the year, this proposal is awaiting completion of a canvass of the States to determine their desires.

Detailed proposals have been submitted to 33 States this year, by the Directors of Extension and Information of the Department of Agriculture. The remaining 15 States are to be contacted as early as possible in 1932, so that the correlated system can be put in operation on a country-wide basis during the year.

Of the 33 States contacted, 22 are ready to handle at least one of the correlated services at the beginning of the new year. Five others have not yet definitely formulated their broadcasting plans.

The Radio Service plans to issue the first material in the new correlated agricultural syndicate service for release January 18, 1932. At least 19 States will be cooperating in the service at that time, with the possibility that seven more, now undecided, will be added to the list before the starting date.

ALAN DAILEY, *Radio Service.*

## RADIO Preferences of Farmers Indicated by Sixteen Test Programs

Farmers are jealous of their radio time. They demand that agricultural or informational programs be easy to listen to, and easy to understand and remember. But they want the subject matter concise and definite, concrete and specific. They resent the inclusion of anything which serves as a distraction from the information itself.

These are the main conclusions gathered from reports of farmer-listeners who gave their judgment on a series of 16 experimental broadcasts presented by the Radio Service of the Department of Agriculture in cooperation with Station WGY of Schenectady, N. Y. Further analysis of those reports, however, gives us considerable insight into what makes for easy listening and ready understanding in a radio program.

In each of the test programs, the same agricultural subject matter was given in two forms and the farmers who volunteered to listen and report were asked to choose between the two and give reasons for their preference. In each case, one of the forms was always the narrative style used by the department in its regular Farm Flashes over Station WGY, and was immediately followed by the same information prepared in another style; for example, the usual news-story style. Each test was repeated a month later but with different subject matter prepared by a different writer.

Tabulation of farmers' reports on the entire series of 16 different broadcasts covering nine different styles of presentation shows that programs prepared in the form of a news-story, as a logically outlined public speech, as a sales talk, as a talk interlarded with jokes and humorous verse, in the form of a fable, and as a narrative, were each less popular with farmer listeners than were the programs written in the form of experience reports from different farmers, those prepared in the form of simple questions and answers, those in a style requiring listener participation by the use of paper and pencil for taking notes and drawing simple charts, or those in a style in which special care was taken to state minor details in specific, concrete terms.

The reasons given by the listening farmers for their preferences are most illuminating. Running through the whole series of reports is a chain of comments which show that one of the best ways to get and hold farmer interest is to talk to him in straightforward, sincere, informal, friendly farmer fashion, and to talk to him about what other farmers have actually done on their farms.

The real is preferred to the abstract or the fictional. And the strong preference shown for the programs containing many specific details appears to be based on the fact that such details help create the illusion of solid reality in the mind of the listener.

It also appears from these farmer votes and opinions that the span of listener attention is very short. Smoothly running talks are evidently not as easy to understand or as effective as those which are broken up and the attention repeatedly brought to a new focus by question and answer or other such devices.

The favorable comments on the talk requiring the use of pencil and notes show that listeners feel a real need for memory helps and indicate that radio writers and speakers should give more attention to providing such helps.

C. A. HERNDON, *Radio Service.*

## REFORESTATION Work in Lake States Aided by Knutson-Vandenberg Act

Planting work on the national forests in the region may be completed in from 30 to 40 years. instead of 120 years, as a result of its passage. Some 1,200,000 acres of idle land in Michigan, Wisconsin, and Minnesota, best suited for timber production, will thus be put to work growing wood in about 25 per cent of the time required under the previous authorization. Public sentiment demands an adequate planting program for this vast area of deforested lands, and the passage of more adequate forest crop laws to encourage reforestation by private owner reflects the leadership of the Federal Government.

Reforestation work in the Lake States is practicable at a relatively low cost. Seed extraction and nursery and planting technic have been developed by study, experimentation, and practice through the past 20 years. (Fig. 112.)

Reforestation work in the Lake States has been given a decided impetus by the Knutson-Vandenberg Act, approved June 9, 1930.

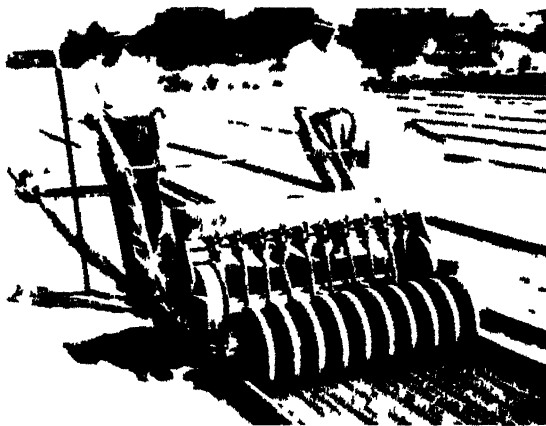


FIGURE 112—Drilling Norway pine seed at Beal nursery, Huron National Forest, Mich. The drill, as well as other labor-saving devices developed by Planting Assistant H. C. Turner, has resulted in a greatly reduced cost of production.

The Forest Service's seed-extraction plant at Cass Lake, Minn., has been enlarged and improved, resulting in a 20 to 30 per cent reduction in the cost of seed. This plant furnishes seed to the Federal nurseries, and supplies a considerable quantity at cost to States cooperating in distribution of trees for farm planting. During 1930, 5,693 pounds of Norway pine seed, 985 pounds of white pine seed, 13 pounds of jack pine seed, and 58 pounds of white spruce seed were extracted.

#### Nursery Capacity Increased

Nursery capacity is being increased to meet the enlarged planting program. Raising trees for planting under field conditions in the Lake States costs from 60 cents to \$1 per thousand, depending on the

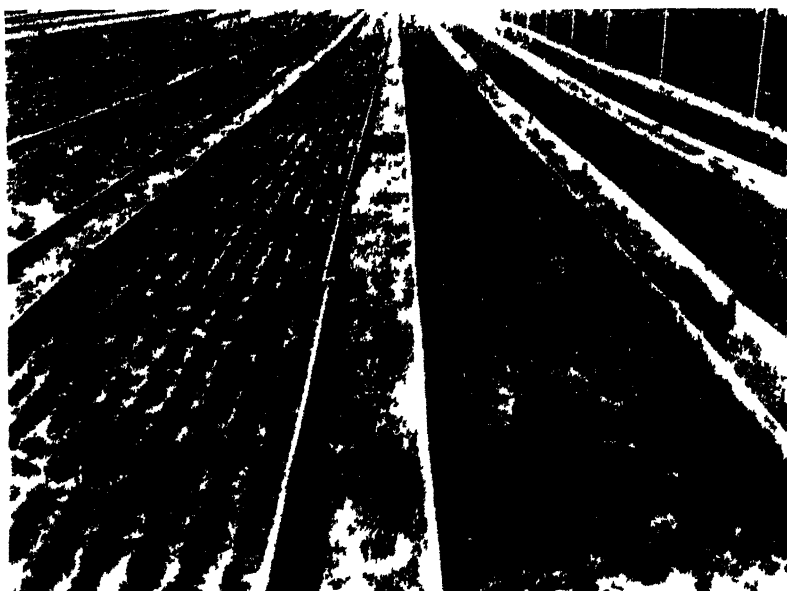


FIGURE 113.—Nursery beds at Beal nursery—1-year-old seedlings in the foreground, and 2-year-old seedlings in upper right-hand corner.

annual capacity of the nursery, species of trees, water and soil conditions, etc. Two-year-old seedlings are usually raised, with no transplanting in the nursery except to produce special stock for experimental use or more sturdy stock for planting under rigorous site conditions.

The Beal nursery on the Huron National Forest, which is producing trees for planting on the national forests in Michigan, is now at capacity production of over 7,000,000 seedlings annually. (Fig. 113.) Cass Lake nursery on the Chippewa Forest is being expanded to an annual capacity of 4,000,000 seedlings, to be used on the national forests in Minnesota.

A new nursery at Rhinelander, Wis., will be in full production by the fall of 1933 with a capacity of 10,000,000 trees annually for planting on the national forests of Wisconsin and the upper peninsula of Michigan. The Rhinelander nursery was started in April, 1931, the site being donated by Oneida County. The Kiwanis organization of Wisconsin and upper Michigan is contributing \$10,000 toward its development. A

fourth nursery in this region will still be necessary to meet the expanded reforestation program.



FIGURE 114 —Planting trees in furrows. Note fire line in the foreground, and scrub oak now occupying the ground.

In planting, furrows are plowed 8 feet apart, with tractor-drawn plows set just deep enough to cut and throw out a ribbon of sod. This furrow eliminates root competition from grass, bracken, and



FIGURE 115 — A successful plantation of Norway pine. Photo taken about six years after planting

shrubs. The seedlings are planted 8 feet apart in the furrows, 700 to each acre, by the use of the Michigan planting bar. (Fig. 114.)

Tractors plow 15 to 20 miles of furrow per day. A mile of furrow is equivalent to 1 acre of land. Each motion required in planting a tree has been carefully studied and all unnecessary work eliminated. A carefully trained, experienced planter will regularly plant 2,500 trees per day.

Total cost, from seed collection, through the nursery, to field planting, in 1930 averaged a little under \$3 per acre. A large part of the remaining area to be planted, however, consists of more difficult planting site and the average cost will be somewhat higher.

Plantations are given special protection by the fire organizations on the national-forest units. Around each section is a 46-foot cleared fire line, constructed with heavy machinery. (Fig. 115)

H. BASIL WALES, *Forest Service.*

## RENOVATED-BUTTER Industry Declines With Decrease in Production of Farm Butter

The manufacture of renovated butter was at one time an industry of considerable importance because of the number of factories engaged in its manufacture and the volume of production. Within the last 15 years, however, the number of factories operating and the amount of renovated butter made have steadily declined. As shown in Table 6, 22 factories operating in 12 States made 27,542,015 pounds of renovated butter in 1917, whereas there were but 5 factories operating in 5 States in 1931 and they produced but 1,498,024 pounds of renovated butter.

TABLE 6—Number of renovated-butter factories operating in the United States in the fiscal years, 1917–1931, and the volume of production

Fiscal year	Renovated-butter factories		States	Renovated butter made	Fiscal year	Renovated butter factories		States	Renovated butter made
	Number	Number				Number	Number		
1917	22	12		27,542,015	1925	7	5		3,843,516
1918	19	11		19,405,672	1926	6	4		2,482,530
1919	17	10		16,667,455	1927	6	5		4,212,306
1920	11	9		9,611,675	1928	6	7		3,161,040
1921	11	8		6,134,034	1929	5	5		3,037,618
1922	8	6		5,355,863	1930	5	5		1,845,360
1923	6	5		4,008,409	1931	5	5		1,498,024
1924	7	7		4,051,463					

In the renovating process the quality of the finished product is materially improved over that of the stock used. However, the finished product does not possess good keeping qualities and, scored on a quality basis, is inferior to good creamery butter. Its use as a table butter has been largely superseded in the last few years by use of good creamery butter, or of butter substitutes. At the present time renovated butter is used chiefly by the baking industry.

Renovated butter is a taxable product. Its manufacturers are required by law to operate under licenses. The proper branding and labeling of all renovated butter, whether made into prints or packed in tubs, as well as the enforcement of sanitary regulations and periodic inspection of all licensed renovated-butter factories, is administered and supervised by the Bureau of Dairy Industry. Reports are sent to

this bureau by the Meat Inspection Division of the Bureau of Animal Industry, representatives of which make at least weekly inspections. Inspection trips are made to these factories by a Bureau of Dairy Industry representative at least twice a year. All cartons and parchment wrappers for renovated butter must be approved by the Secretary of Agriculture. When the product is solidly packed in quantities of 10 pounds or more it must, in every case, be marked on the surface with the words "Renovated Butter," or "Process Butter," in letters not less than one-half inch square, of Gothic style and depressed not less than one-eighth of an inch. It must be similarly marked when sold in print or roll form. The wrapper and carton must be labeled in letters three-eighths of an inch square.

The fact that the dairy farmer generally receives more money for butterfat sold to creameries in the form of cream than for butterfat sold to the country store in the form of dairy butter, shows a desirable trend in rural dairy conditions. The marked decrease in the amount of butter made on the farm and the resultant shortage of packing-stock butter, from which renovated butter is largely made, is undoubtedly the principal factor in the decline of the renovated-butter industry. The poor quality of available packing stock, the natural prejudice against a renovated product, the general improvement in quality of creamery butter, and the increased use of butter substitutes have all contributed to a lessened demand for this product and to the decrease in the amount manufactured.

CHAS. S. TRIMBLE. *Bureau of Dairy Industry.*

**R**OAD Building on Secondary or Local Projects is Progressing When people speak of farm-to-market roads it is never clear just what kind of roads they mean, and what other kinds of roads there may be that are not properly to be described as farm-to-market roads. Such references are especially puzzling to those who have thought of all rural roads as farm-to-market roads.

To be sure there are some roads that serve little traffic except that which originates largely on the farms; and some that carry, in addition to the farm traffic, a heavy intercity movement of vehicles. There are some whose total traffic, without regard to character, is light; and others that carry a tremendous traffic; and, by and large, it may be observed that the roads that serve the heaviest total traffic—which are the principal intercity roads—are likely to serve also the heaviest farm traffic, and are, therefore, the most important farm-to-market roads. (Fig. 116.)

Certainly, it is true that the farmers' markets—for buying as well as selling—are in the cities; and the bigger the city the better the market. It appears that the principal distinction to be drawn between roads is one of importance rather than of kind. So, when someone says that, "really we shall have to do something about the farm-to-market roads," we can conclude that what he actually means is that it is time now to be doing something more effective for the improvement of the less important roads, the local or secondary roads as they are called. And so it is.

It is time to extend to the secondary or local roads some more effective improvement; and the time has arrived when that more effective

improvement will be extended. It not only will be done; it is being done, and the process is already well advanced.

There are very definite reasons why progress in the improvement of the secondary roads under the supervision of the local authorities has been slow in the past.

### Local Planning Not Systematic

First, there has been a lack of order and plan in the efforts of the local authorities, and their organization and equipment for the work have been seriously deficient. How many people realize that nearly half of the more than 3,000 counties in the United States are trying to build roads without any engineering direction whatever, and with none but the most primitive road-building equipment? That is a fact; and it is also a fact that, of those counties that do have at least the most



FIGURE 11b.—Farm-to-market traffic on a State highway

essential equipment and the basis of an engineering organization, not more than half again are really adequately equipped and organized to handle the difficult task of building roads for modern traffic.

Thus poorly equipped, these counties have been trying, year after year, to improve all their local roads, spreading their slender revenues over a mileage so great that the slight benefits of each year's work have been lost by the beginning of the next road-building season. That is one of the reasons why progress in the improvement of the local roads has not kept pace with the more orderly improvement of the main roads by the State and Federal Governments. But a movement is under way, and already well advanced, the effects of which will soon be evident in a very material improvement of the condition of the local roads. That movement is the steady enlargement of the systems of State and Federal aid roads, which in recent years has been taking place more rapidly than most people realize.

In the selection of the roads that make up these systems, the Federal and State Governments have wisely avoided the mistake of the county

and township authorities. They have limited the extent of the systems to the mileage that could be improved as a whole in a reasonable length of time. The roads chosen have been the most important roads; and together they form a connected network that covers the entire country.

### Limitation of Federal Aid System

The Federal law limited the size of the Federal aid system to 7 per cent of the total mileage of roads with the definite purpose of preventing the wasteful scattering of the national appropriations; but it provided that when this limited mileage had been improved other roads could be added.

In six States the mileage selected under the original 7 per cent limitation has already been improved and the size of the system has been increased by adding other roads; a similar extension will soon be possible in a number of other States.

In a similar manner and for the same reason, the States have limited the initial mileage of their State systems. But they, also, have found it possible from time to time to add to the extent of these systems. Between 1921 and 1930 they took over from the counties more than 120,000 miles, and there is no doubt that they will continue to take over additional mileage as rapidly as that already taken is improved.

This process of gradually increasing the size of the Federal aid and State highway systems is having two effects: (1) It brings under the control of the well-equipped Federal and State highway departments mile after mile of the more important county roads and insures that they will be improved as their importance demands; (2) the roads taken over, being the more heavily traveled county highways, are those which have required the largest expenditure. Relieved of them, the counties are able, without increase of local taxes, to expend a larger sum per mile on the remaining mileage and so to effect a more lasting improvement.

### Revenue From Road Users

This, then, is one way in which Federal and State improvement of the principal highways—all of them farm-to-market roads—is brightening the prospect for more rapid local road improvement. There is another result of this orderly development that works in the same direction. The improvement of the main roads alone has made possible the great increase in the number of motor vehicles in use. The high class of service afforded to these motor vehicles by the improved main roads has made the owners of the vehicles willing and able to pay ever-increasing sums for road construction and maintenance.

Between 1921 and 1930 the amount of this payment by the owners of motor vehicles increased from \$127,000,000 to \$850,000,000. The portion of these increasing funds that has gone into the State treasuries has provided the means for taking over from the counties an increasing mileage of the more heavily traveled local roads that have been the counties' greatest burdens. But while the local governments have thus profited indirectly, they have also shared directly in these increased earnings of the main roads; for the share of the motor-vehicle taxes paid directly to the counties has increased from \$22,000,000 in 1921 to \$165,000,000 in 1930.

The fact that the motor-vehicle owners, as a class, are the most willing of taxpayers, means that they feel that they are more than repaid by the road service they receive in return, and this return and consequent willing tax payment are primarily the result of the improvement of the main roads.

This is the result of the wise policy of selecting for first improvement the most important roads. The improvement of these roads has earned a surplus above their cost of maintenance, which surplus it has been possible to use for the improvement of other roads in the order of their importance. Only by the orderly process that has been followed could this result have been achieved; and it is only by the extension of this same process that the roads of lesser importance can be progressively and adequately improved without laying an increasing tax burden upon real property and particularly upon farm property.

### Less Expensive Types of Roads

There is one other development of the last three or four years that will speed the improvement of the local farm-to-market roads. That

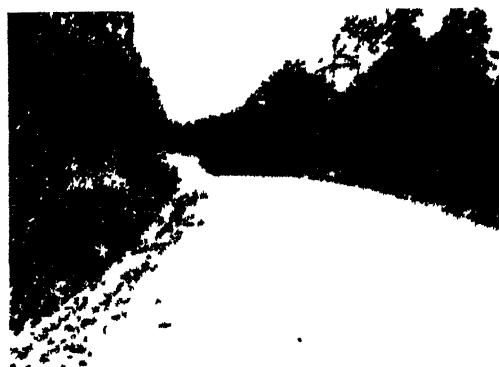


FIGURE 117 — A surface-treated sand-clay surface suitable for secondary roads which can be built at moderate cost

is the success that has attended the experiments that have been made over that period looking to the development of less expensive types of road surface suitable for the lighter traffic of these roads. (Fig. 117.) That success has been supplemented by the remarkable progress that has been made in the adaptation of labor and time saving machinery for the construction of such roads. By the use of such equipment for the building of the less ex-

pensive and yet entirely adequate types of roads that have been developed recently, it is going to be possible in the future to make the secondary-road dollar go farther and do more in the way of lasting and serviceable improvement.

So, there is every assurance that the improvement of the farmers' market roads will go forward with even more rapid progress. The principal roads have already been improved by the Federal and State Governments. By their taking over of more and more of the important secondary roads which are the heaviest burden upon country finances, the task remaining for the counties will be greatly eased. The increased earnings of the main roads in taxes paid by motor-vehicle users will provide increasing revenues for the improvement of county as well as State roads; and by the use of the new methods of low-cost road construction the county revenues thus conserved and augmented will be used more efficiently and productively.

The future of the farm-to-market roads—all of them—has never been brighter. But in order that the results of future expenditures on those which remain under the control of the county and local authorities may

be as effective as possible, it is still desirable that there be a marked improvement in the organization and equipment of the local governing bodies.

### Engineering Supervision Essential

Particularly is it desirable that all local road work be carried on under engineering supervision. There may still linger in the minds of some people a feeling that roads can be built without technical direction. There was a time not so long ago when that opinion was entertained by many people. But the demonstration of the effectiveness of technical control which has been made in the improvement of the Federal-aid and State highway systems should have convinced most of the doubters.

However that may be, building roads for modern traffic can not be efficiently carried on without the highest type of technical direction obtainable; and that kind of direction the counties must endeavor to provide for the success of their local road programs—that and the necessary equipment and plant which such direction will suggest.

It is probable that efficient technical supervision and adequate equipment will be obtainable in many cases only by the consolidation of several counties into larger administrative districts. This, for the reason that the overhead cost of the necessary supervision and plant would constitute too large a proportion of the total cost unless it were spread over a greater volume of work than many of the existing counties have to do.

By such consolidation of administrative control, and the employment of the efficient supervision and equipment which will thus be made possible; by following the orderly process of improving the roads in the order of their importance, after the example set by the National and State Governments; by these means will the work that must always remain under local control be brought to a high standard of efficiency. And such are the means by which the local farm-to-market roads will ultimately be raised to a state of improvement comparable with the present state of the primary roads.

THOMAS H. MACDONALD, *Chief, Bureau of Public Roads.*

**R**ODENT-CONTROL Studies The need for the control of rodents has grown as agriculture has developed. The most important factor limiting rodent abundance—that of seasonally scant food supply—has been removed in many areas for such species as have proved capable of accommodating themselves to changed conditions, and many of them early developed into first-class agricultural pests. Not only is their control necessary for economic reasons, but in some places because of consideration for human health. Examples of this are found in the bubonic-plague infestation over wide areas among the California ground squirrels as well as spotted fever among other ground squirrels in the Rocky Mountain region. Fortunately, an increasing knowledge of the animals' habits and of their physiological responses has made it possible for the Bureau of Biological Survey to develop methods of control that are constantly becoming more specific. Educational methods also are employed by the bureau to win the agricultural population to adopt newer methods in rodent control, in preference to the crude formulas and methods of application formerly in universal use.

Some years ago W. C. Jacobsen, of the California Department of Agriculture, made a study of the rodent problems in California and of efforts for their solution. The earliest community rodent-control project of which he found record was one conducted about the Santa Barbara Mission in 1808. Since that day settlers in California and in other Western States have found it necessary to resort to intensive campaigns, using every sort of device and agency to protect their crops against the swarming hordes of rodents.

Poisons of various kinds were early used by farmers, some of the baits, in the light of present-day knowledge and practice, being of astonishing strength. Mixtures of 1 ounce of phosphorus to 6 pounds of wheat, and strychnine and cyanide combinations of almost the same proportionate strength, were rather widely used. Poisoned water also was used in some localities with deadly effect, not only on ground squirrels but also on other forms of mammals as well as on birds. One astonishing formula printed in California in 1873 recommended 24 ounces of strychnine to 2 quarts of wheat. This is in startling contrast with the present-day proportions of 1 ounce of strychnine to 20 or more pounds of grain. Phosphorus was a favorite with many farmers because of its cheapness, despite the fact that occasional grain fires were almost certainly traced to its use.

About 1909, S. E. Piper, of the Biological Survey, began investigations of rodent damage, methods of reducing the losses, and the possibility of reducing the proportion of poison in the baits. His tests and those of many subsequent Biological Survey investigators have gradually established four important facts that have aided greatly in making poison formulas more specific against such rodents as become pests:

(1) Animals, including birds, show a great variation in their resistance to any poison; long before it was demonstrated in laboratory tests, control workers knew in a general way that it was much more difficult to poison birds than mammals. (2) Mammals, even races of the same species, show a constant variation in resistance, which can be utilized to advantage in selective control. (3) Sufficient variation exists in choice of food and in manner of feeding among various species to make utilization of these factors feasible in control work, including seasonal and territorial change of baits. (4) In some localities poisons that are effective at one season are ineffective at others, possibly because of food interference with the lethal action.

#### Some Birds Practically Immune to Strychnine

An example of the first point is found in gallinaceous birds, whose tolerance to strychnine is so high as to amount to practical immunity from its effects. This fact has been demonstrated time and again by feeding tests on quail, domestic chickens, pheasants, and others, and the results made available in a mimeographed leaflet (Bi-1028) of the Bureau of Biological Survey. Pigeons and doves also show the same resistance to strychnine, though in a lesser degree. The lethal dose of strychnine for these birds is approximately four times as great per unit of body weight as in the case of ground squirrels. Other birds also show higher resistance to other poisons than do the mammals commonly classed as pests. Obviously weakening the formula by spreading the poison over greater quantities of bait material would operate to the advantage of the resistant groups. For example, the old phosphorus formula required only two or three kernels of wheat to kill the average

pigeon; in the strong strychnine mixtures of the early days 20 to 40 kernels would be sufficient; while in formulas recommended at present a lethal dose requires about 100 kernels. Where poison is distributed in small baits intended for the less-resistant forms, as ground mammals, it is apparent that the chances of an individual bird picking up 100 kernels of grain are much less than of its getting 2 or 20 or 40.

The difference in resistance to poison by closely related forms of animals, even of races of one species, is exemplified in Douglas's ground squirrel (*Citellus douglasii*) of northern California and western Oregon. This rodent is easily susceptible to strychnine, while in California south of the San Francisco Bay region the nearly related California ground squirrel (*C. beecheyi*) is one of the most resistant.

In Montana, northern Idaho, and eastern Washington the Columbia ground squirrel (*Citellus columbianus*) is one of the most difficult to handle. Strychnine is much less effective against this rodent in this territory than in northeastern Oregon, and for many years this was not understood. In 1928, when the species was divided into two races, the line of demarcation followed closely the boundary that had been noted in the differences in reactions to poison.

Curiously enough, the Columbia ground squirrel and the Oregon ground squirrel (*Citellus oregonus*), which are found more or less closely associated in northeastern Oregon, have such a marked difference in susceptibility to strychnine that it is possible to prepare a grain mixture to kill the latter without harming more than a very small percentage of the Columbia squirrels, even though these may feed freely on the bait. This fact complicates control of the Columbia squirrel with bait intended for use against the Oregon species.

### Food Preferences Utilized

An example of the third point is found in the fact that small birds have been found in a majority of tests to prefer wheat to barley or oats, while ground squirrels of several species prefer the coarser grains to the wheat. Advantage has been taken of this, and as a result wheat has been gradually eliminated as a bait material, despite the fact that at the time organized study of the control problem began, it was the bait most widely recommended and used for rodent control. Many tests repeated at various seasons over wide territory have demonstrated this habit of discrimination to be general, even though occasionally the squirrels will eat one grain as readily as another, and less frequently small birds will not display any selectivity even though given a choice.

The development of pouch poisons for ground squirrels as opposed to stomach poisons is another and outstanding example of increasing efficiency in control through taking advantage of the rodents' manner of handling foods. Baits can be prepared in such manner as to release poisons in the mouth and thus kill ground squirrels that pick up quantities of the grain in their cheek pouches, rather than await the much slower absorption through the stomach. Consequently smaller proportions of poisons than previously were thought necessary are now used in the baits.

Neither pouch nor stomach poisons, however, are particularly effective against the Columbia ground squirrel because this species does not often pouch or eat sufficient grain without hulling it to carry a killing dose. Successful control of this species has been obtained by preparing a coated bait with flour paste, which is brittle and easily flakes off in the mouth as the grain is hulled.

The California ground squirrel furnishes the outstanding example of seasonal variation in response to poison. During the summer and fall months pouch poisons carrying strychnine as the lethal agent are quite generally successful. Spring operations are markedly less so, yet other poisons substituted for strychnine at this season are satisfactory. Variations in feeding habits and character of foods taken, and perhaps food interference with the action of poisons, play a part in producing this state of affairs.

Much educational work on the part of the Biological Survey has been necessary to teach the desirability of undertaking control not only at the proper season but also on a community and crew basis. Organizing control work on a community-wide basis accomplishes two things: It reduces the possibility of reinfestation from one farm to another; and it greatly reduces the length of the poisoning season. Where the practice of covering a considerable territory at one time does not prevail, poison is commonly exposed by farmers at one point or another over a period of months. Formerly they would place handfuls here and there, on stumps, in logs, and at other places where the rodents might find it, sometimes many days later. For these sporadic practices there has been largely substituted the community method of scattering over a given area sufficient baits of grain directly at the entrances of the burrows of the rodent it is desired to kill, and doing this at a season when that animal is feeding on grain. This method normally results in a good rodent clean-up over the entire area treated and consequently in lessened necessity for further exposure of poisons during that season.

Poisoning has thus far proved to be the most effective method of dealing with rodent pests. Bounties have resulted either in fraud or in unprofitable expenditure of large sums of money. Guns, traps, and other mechanical devices are hopeless means of control in the face of the endless hordes of rodents always present. So-called viruses, such as those widely advertised for controlling rats, have never been satisfactory and, furthermore, are looked upon with disfavor by many health authorities as a possible source of spread of diseases to human beings. They have not been used in control campaigns conducted by the Biological Survey.

Of fumigants for burrowing species, carbon bisulphide is the most satisfactory thus far employed. It has been widely used against California ground squirrels, in some places with great success. Though too expensive for practical use in heavy infestations, carbon bisulphide is valuable chiefly as a follow-up agent, where the rodent population has already been greatly reduced by poison. Calcium cyanide is useful as a fumigant to a certain degree, but it has not completely fulfilled the high hopes early held for it by control workers. Fumes of sulphur, gasoline, petroleum distillate, and kerosene also have been tried with varying success, but none of these substances has yet come into general use.

Poisoning and fumigating are the only known methods offering any possibility of satisfactory solution of the rodent-control problem, and of these, poisoning is the more practicable. Contrary to the opinion commonly held, it is possible, with our present knowledge of the characteristics of poisons and of the habits of animals, so to select, prepare, and expose baits as not seriously to endanger animals other than the rodents for which the poisons are intended. Ordinary precautions, of course, are always to be taken in handling any poison, so as not to endanger human beings, domestic stock, or valuable wild life.

IRA N. GABRIELSON, *Bureau of Biological Survey.*

# RUBBER Plant Hybrids of Madagascar Species Prove Vigorous in U. S.

Hybrids of two species of Madagascar rubber vines, *Cryptostegia madagascariensis* and *C. grandiflora*, are being studied and propagated in southern Florida. In the past a good grade of rubber known as "palay" has been obtained from the wild plants in Madagascar by primitive methods.

One of the species (*C. madagascariensis*) was introduced into Florida more than 30 years ago and has been planted extensively as an ornamental (fig. 118), while *C. grandiflora* has escaped from cultivation and become established in the West Indies and in many portions of Mexico. Plantings of both species have been made at several points in southern California and Arizona, and the plants have grown well for several years.



FIGURE 118 — A branch of *Cryptostegia* flowers



FIGURE 119 — *Cryptostegia grandiflora* growing over a hedge near Gonaïves, Haiti

The two species have been mistaken for each other and the names often are applied to the wrong plants. Yet the two are distinct and hardly to be confused once the real differences are recognized. The



FIGURE 120—A plant of *Cryptostegia madagascariensis* growing in Fort Myers, Fla.

borders, the plants of the latter species usually are trimmed to a rounded form. (Fig. 120 )

#### Hybrids Show Increased Vigor

The hybrids are from seed from a single pod obtained from a plant of *Cryptostegia grandiflora* growing near Miami, Fla., in 1926. In growth they have shown a greater vigor than plants of either of the two parent species. They are of a strong whip-like type of growth (fig. 121), similar to that of *C. grandiflora*, but their leaves bear a closer resemblance to those of *C. madagascariensis*, and their floral characters are intermediate between those of the parent species.

Numerous analyses of the hybrids in comparison with the parent species have been made. In all com-

most striking of these differences are the type of growth and leaf characters, *Cryptostegia grandiflora* having a stronger tendency to grow as a trailing vine with long whiplike shoots (fig. 119) and broadly elliptical leaves with reddish midribs, while *C. madagascariensis* has narrower, firmer, and smoother leaves with white midribs. When grown on lawns or in



FIGURE 121—Hybrid *Cryptostegia* plant growing on wall of plant shelter near Miami, Fla.

parisons the hybrids have had a higher percentage of rubber than either *Cryptostegia grandiflora* or *C. madagascariensis*, in addition to having a greater total yield, due to their increased growth. The mean rubber content of 20 plants in southern Florida remained nearly constant from September, 1930, through January, 1931, monthly analyses showing a mean of from 4.18 to 4.97 per cent rubber. The highest individual rubber content recorded during this period was 6.98 per cent. The mean rubber content of 20 plants of *C. madagascariensis* analyzed monthly from August to December varied from 1.75 to 2.22 per cent, the highest individual rubber content being 3.51 per cent. The mean rubber content of 20 plants of *C. grandiflora* analyzed in August, September, and October varied from 1.63 to 1.90 per cent, the highest individual rubber content being 2.94 per cent.

In contrast with desert plants, which secrete less rubber under conditions of vigorous growth, the species of *Cryptostegia* yield a greater percentage of rubber under those conditions, and it appears probable that the higher rubber content of the hybrids may be connected with their increased growth vigor.

LOREN G. POLHAMUS, *Bureau of Plant Industry.*

## SEED-CORN Maggot Injury Avoided by Suberizing Potato Seed Pieces Before Planting

Newly planted potato seed pieces of the early spring crop on the eastern coastal plain are often seriously injured by an insect commonly known as the seed-corn maggot (*Hyalemyia ciliatula* Rond.). This insect occurs throughout the temperate regions of North America and is known to attack a wide range of plants. In addition to the potato, sprouting seed and seedlings of corn, beans, spinach, cucumbers, turnips, melons, and peas are subject to attack. The adult of the maggot is a fly smaller than the house fly and grayish in color. The female deposits the eggs in the soil, and the maggots develop from these.

Injury to potato seed pieces results from holes or tunnels cut into the potato by the maggot during feeding. The feeding always begins at some spot on the cut surface of the potato seed piece, as the maggot never attacks the uncut surfaces. From the point of entry the maggot tunnels into all portions of the seed piece. Several maggots may attack the same seed piece; as many as 75 have been found in one piece. Heavy infestations of the insect cause the complete destruction of the seed piece. Less severe attacks result in the development of weak, spindling sprouts from the partially devoured seed pieces. The damage is greatest during seasons when seed germination and growth of the young plants are retarded by unfavorable weather and other conditions. In the spring of 1921, when the weather which followed the planting of early potatoes along the entire Atlantic seaboard was unfavorable, injury from attacks of this insect was unusually severe. As much as 50 per cent of the plantings in the commercial-production areas of the Carolinas was destroyed.

Potato seed-piece decays are often closely associated with seed-corn maggot infestations. Seed pieces that show only a slight degree of decay on their cut surface are very susceptible to attack by the insect. Feeding of the maggots on such seed often causes the decay to be

spread to all portions of the tuber. Decay usually takes place in badly infested seed pieces either before germination or while the plant is small.

### Experiments for Control of Seed-Corn Maggot

Studies on the control of this pest have revealed that certain farming practices greatly increase the possibilities of seed-corn maggot attack. Among these are the planting of potatoes in soils containing partly decayed remnants of a recently grown winter crop and the use of large quantities of organic fertilizer materials. However, for cultural reasons it is hardly possible for the commercial grower to select vegetation-free soil and abandon the use of organic fertilizers. No chemical treat-

ment that was tested prevented the seed-corn maggot from feeding on seed potatoes.

Suberization, or corking over, is nature's way of healing the cut surfaces of the potato and will take place in the soil if the conditions are favorable. However, at the time the early spring potato crop is planted, suitable conditions for proper suberization of the seed are often the exception rather than the rule.

Suberization of cut potatoes in advance of planting has been a subject of study for

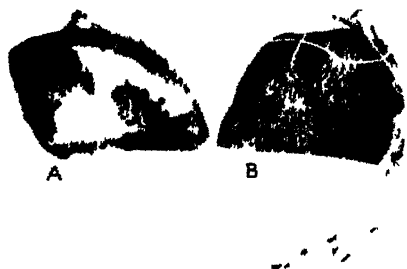


FIGURE 122 —A, Potato seed piece planted immediately after being cut, showing maggots at work and a weak sprout, this seed piece was honeycombed by maggots, B, suberized seed piece cut two weeks before planting and planted at the same time and under the same conditions as the one shown in A

several years. In investigations aimed at control of the seed-corn maggot, the objects have been to devise practical means of suberizing cut potatoes on the farm and the testing of such seed as a means of preventing seed-corn maggot injury. The corked seed has been compared in field experimental plats with seed planted immediately after being cut. Planting of freshly cut seed is the usual commercial practice in regions where seed-corn maggot injury is most prevalent. These experiments show quite conclusively that the use of well suberized seed potatoes will practically eliminate seed-corn maggot injury regardless of the type of fertilizer used or the quantity of decaying vegetation in the soil. (Fig. 122.) In comparison with seed planted when freshly cut, well-corked seed potatoes have averaged a slight increase in yield even in plats where there was no seed-corn maggot infestation of the freshly cut plantings.

### Method of Suberizing Seed Before Planting

Effective suberization of the cut surfaces of seed potatoes can be obtained if the seed is thoroughly disinfected, cut, and stored for 10

days to 2 weeks at a temperature of 55° to 65° F. and at a humidity of 80 to 90 per cent.

A storage cellar is usually a satisfactory place in which to store cut seed pieces, as the proper temperature and humidity for suberization are easily maintained. Before putting in the cut seed the cellar should be thoroughly cleaned and all decayed vegetable matter removed. It is further advised that the walls, floors, and all storage containers, such as baskets or barrels, be sprayed with a suitable disinfectant, such as 5 per cent copper sulphate or 2 per cent formalin or the solution used for treating the potatoes, before they are cut, to insure against development of decay organisms on the freshly cut surfaces. If a cellar is not available, any room can be partitioned off for this purpose with one of the commercial insulating boards. If a dirt floor can be provided, the problem of maintaining the proper humidity will be relatively simple, for this can be accomplished by keeping the floor moist. If it is necessary to heat the storage room to maintain the desired temperature, a small brooder stove can be used with convenience and safety.

Immediately after being cut (they should not be allowed to dry off) the seed pieces may be stored in crates, baskets, or barrels. At 24 and 48 hours after cutting, the seed pieces should be aerated by being carefully poured from one container to another. This treatment also serves to break apart the pieces that have stuck together. Suberized seed should not be kept in sacks, as the healed surfaces will be readily rubbed off and the purpose of the storage defeated.

It has been found advantageous to move the cut seed, after the healing or storage period, to a room or a building where the humidity is about 60 per cent and the air temperature between 55° and 65° F., keeping the seed there for a day or two in order to allow the healed surfaces to dry and toughen before the seed is handled for planting.

W. J. REID, Jr., *Bureau of Entomology,*

W. M. PEACOCK and R. C. WRIGHT,

*Bureau of Plant Industry.*

**SEED-TESTING Service** Protects Farmer in Case of Many Principal Crops Because of the service that seed testing renders to agriculture, no farmer need plant seed without knowing much about its possible crop-producing value. Most States require that agricultural seeds sold within them shall carry a statement showing the chief factors in their agricultural value. The analysis tags or labels attached to the seed at the time of sale give information on some or all of the following particulars as to each lot of seed: Kind of seed; percentage of pure seed; percentage or number of noxious and other weed seeds; percentage of other kinds of crop seed; percentage of dirt, chaff, and other worthless matter; percentage of germination (that is, percentage of the pure seeds producing seedlings capable of continued growth—those of agricultural value); and origin.

The farmer has a vital interest in the factors disclosed by the analysis of seeds. He is interested in knowing that he is getting the kind of seed he wants and that it is not adulterated with some other kind of similar-looking seed. While there is comparatively little adulteration of agricultural seeds in the United States at the present time, the statements on some dealers' tags are designed to mislead rather than to enlighten the purchaser.

A typical case of such misleading labeling which recently came to the attention of the United States Department of Agriculture is given below:

Statement on label attached to the seed		Found on analysis	
RED-CLOVER SEED MIXTURE			Per cent
	Per cent	Red-clover seed.....	50. 74
Pure seed.....	73. 76	Sweetclover seed.....	32. 79
Crop seed.....	20. 54	Other crop seed.....	8. 81
Alsike.		Timothy.	
Timothy.		Alsike clover.	
Sweetclover.		Alfalfa.	
Inert.....	2. 40	White clover.	
Weed seeds.....	3. 40	Canada bluegrass.	
Buckhorn.		Inert.....	4. 22
Plantain.		Weed seeds.....	3. 44
Sour dock.		Germination:	
Foxtail.		Red-clover seed.....	70. 50
Carrot.		Hard seeds.....	5. 00
Germination.....	85. 00	Sweetclover.....	50. 50
		Hard seeds.....	8. 00

The seed to which the label was attached had been transported by truck from one State into another and was being sold from the truck.

Farmers should be particularly critical of seeds that are offered in one State carrying the analysis of a dealer in another State, unless the dealer in the other State is known to be a reliable one.

#### Buyer Should Know Weed-Seed Content

The purchaser is interested in the weed-seed content, so as to know when he is being offered seed containing large proportions of seeds of the more common weeds, or when the seed contains even a small number of seeds of weeds that are not already growing on his land and that may prove troublesome and difficult to eradicate. The seeds of many troublesome weeds may remain alive in the soil for 20 to 50 years or longer.

The farmer is interested in knowing what proportion of the bulk of seed he is buying will produce seedlings that will grow into plants under favorable conditions in the soil. No seed is of agricultural value unless it is capable of doing this. He is also interested in knowing the type or variety of the seed he is buying, as this determines in large measure its adaptability to local conditions and to his particular use. The determination of type and variety is the most difficult of all determinations. In some cases it can be made from an examination of the seed itself. In many cases the seeds of different varieties are not definitely distinguishable, and then the trueness to type or variety depends on certification based on field inspection, on the reliability of the seed-selling agency, or on subsequent growing of the crop.

In the case of many of the principal crops, it is now possible to buy seed that has been certified as to type or variety by a State agency. This certification is based on field inspection followed by analysis of the seed. This State-certified seed is now obtainable through seed-handling agencies, both cooperative and private, as well as from the producers.

#### Sealed Under State Supervision

Seed that is State certified as to type or variety is sealed under State supervision in sacks of various sizes so that it goes to the ultimate consumer in the original, unopened package. Seed sold in any State

under the label required by that particular State carries the guaranty of the seller as to the statements made on the tag. Seed sold by a dealer in one State to a farmer in another State is not subject to the law governing the sale of agricultural seeds in the State into which the seed is shipped, and the purchaser is largely unprotected. The majority of cases of the sale of misbranded and worthless seeds which are reported to the United States Department of Agriculture are those in which the seed has been sold from one State to a farmer in another for his use and so is not subject to the protection afforded by State law.

The Federal seed act prohibits the interstate shipment of fraudulently misbranded seeds. In most States authority is granted under State law to withhold from sale or to seize any seed which the State finds to be misbranded, while under the interstate clause of the Federal seed act it is only possible to seize seed that is fraudulently misbranded. Obviously, then, the farmer who buys his seed in his own State has greater protection than the farmer who buys seed from outside his own State. In all cases where the purchaser has any doubt as to the correctness of the label, accurately drawn samples should be sent for analysis and test to the seed-testing laboratory of the State in which the purchaser lives, or to the Division of Seed Investigations, Bureau of Plant Industry, United States Department of Agriculture, Washington, D. C. The facts as to quality on which the various forms of protection to the seed purchaser have been built up are directly dependent on seed testing.

Seed testing protects the farmer in his purchases of agricultural seeds in so far as the farmer avails himself of the protection that is his for the asking.

E. BROWN, F. H. HILLMAN, and E. H. TOOLE,  
*Bureau of Plant Industry.*

**S**HEEP are Handled Advantageously Under the Bedding-Out System For many years the most progressive sheepmen of the Southwestern States have recognized that open, loose herding of sheep and 1-night bed grounds are of special value in the production of fat, healthy sheep and are of great benefit to the range. To determine from actual practice the results of this system as compared with those of the old system of returning to an established bed ground, a study was made by the Forest Service on the Madison National Forest in south-central Montana. Definite information was desired on (1) the possibility of open, quiet herding without returning to an established camp at night; (2) the advantages of such a system to the range and to the sheep as compared with the old system; and (3) the method and organization necessary for successfully applying the new system. Several flocks of sheep were handled under each system and under such range conditions as would make the results comparable and reliable.

### The Bedding-Out System

In handling the sheep under the bedding-out system they were, whenever it was practicable, allowed to camp where night overtook them. Leaving the bed ground early in the morning, they would always have fresh feed. (Fig. 123.) They soon drifted away from the bed ground openly and quietly, the herder, if necessary, turning the

leaders. As soon as the sun was shining brightly they customarily bedded down in the shade of the pines or under browse along creek beds. In the afternoon they commenced to graze again. The herder would let them drift, turning the leaders or retarding their progress if necessary. In the evening they gradually pulled together and by dark they were all in a band, and were allowed to bed for the night.

### Herding Under the Old System

Under the old system the sheep were returned to an established camp each night. They were herded practically all day and kept in a more or less compact band by dogs. At night they were gradually herded back to the old bed ground. Dogs were used frequently in turning the leaders and keeping the tail end of the herd up with the leaders. The herder's camp was moved five times in 50 days. Camps were always near a small spring or stream and vegetation in the immediate vicinity was almost completely destroyed by the trailing to and from the bed grounds.



FIGURE 123.—The band  $s_1$  reading out in the early morning on clean feed

### Comparison of the Two Systems

It was found that the sheep handled under the old system of close herding and returning to a permanent camp ground each night used 47 per cent more range than the sheep that were allowed to graze quietly and openly and bedded where night overtook them. (Fig. 124)

The "blanket" system is especially adapted to the production of early maturing lambs. Under the old system sheep are likely to be dogged and jammed, and the lambs get little rest and little sleep, and are frequently separated from their mothers. When the sheep are allowed their freedom the lambs feed and rest naturally, grow much faster, are cleaner, more easily handled, and less likely to be crippled.

The average net gain per day of the lambs under the bedding-out system was 0.43 pound compared with 0.38 pound made under the old system, making 0.05 pound per day per head in favor of the new system. Lambs grazed under both systems were trailed to Alder, Mont., and sold at 5 cents per pound. At this figure the average gain

in value per day per head under the bedding-out system was \$0.0215, as compared with \$0.019 made under the old system, or a net gain in favor of the new system of \$0.0025 per head per day. On a flock of 1,000 lambs the net gain per day would be \$2.50, or for a grazing season of 90 days the net gain would be \$225 in favor of the bedding-out system. In other words, each lamb grazed under this system made a gain of 22½ cents per head more in a period of 90 days than did the lambs grazed under the old method.

#### Method of Handling Accounts for Increase

This increase in weight of the lambs grazed under the bedding-out system and the increased grazing capacity of the range can be attributed entirely to the method of handling the sheep, since (1) the ewes and lambs were all high-grade range sheep; (2) were grazed on practically the same kind of allotments; (3) were supplied with similar facilities for watering; and (4) were salted regularly and in sufficient quantities to keep their appetites normal.



FIGURE 124.—Sheep ready to bed down near the herder's tepees

#### New System Costs No More

The amount of labor is practically the same under both systems. Time consumed in driving the sheep to and from an established bed ground is offset by the time consumed in moving the tepee to where the sheep are to be bedded down at night. Ordinarily in the Madison Forest a tepee and a saddle horse for moving it are required as extra equipment under the improved system.

A timbered range is as suitable for the blanket system as are open park areas. According to one herder, it is the only method of handling sheep in timbered range. The best results, he said, are obtained by turning sheep loose because they are more nervous in timber and the use of dogs increases this nervousness.

GLEN A. SMITH, *Forest Service.*

**S**HEEP Culling Largely on the Basis of Dryness Is Seldom Justifiable Approximately 60 per cent of the income normally to be expected from a range ewe is derived from the lamb she raises; the remaining 40 per cent represents the value of her fleece. Hence the importance, to the range-sheep industry, of a high-percentage lamb crop measured in lambs that reach market age or maturity, can be readily recognized.

The ewes which produce the normal two crops each year—a lamb and a fleece—are the profitable ones and they must make up for the loss that is likely to be sustained on ewes in the dry band before the enterprise as a whole can show a profit. Since in a normal year about 10 per cent of the ewes in a flock may not drop lambs, the question arises as to whether dryness in young ewes may be taken as an indication of a likelihood of their poor lambing performance in later years, and whether culling should be done with considerable attention to that factor.

### Records of More Than 2,000 Ewes Studied

The practice of culling on the basis of two consecutive years' dryness has been followed by some sheep producers. A study of the lambing records of the United States Sheep Experiment Station at Dubois, Idaho, indicates that dryness in range sheep is probably much less an inherited tendency than the result of chance or a combination of outside factors. Accordingly, the culling of young ewes chiefly on the basis of their failure to produce lambs as 2-year-olds or as 3-year-olds is not justified. The records further indicate justification for retaining in a flock even those ewes which fail to produce lambs both as 2-year-olds and as 3-year-olds provided they are superior individuals in both fleece and mutton conformation.

The records cover a period of 10 years, during which a total of 2,009 purebred Rambouillet ewes were in the lambing bands as 2-year-olds. Of this number 78.9 per cent lambled during their first lambing year, or as 2-year-olds. After the usual cullings practiced at this station, 396 of the 423 ewes which failed to lamb as 2-year-olds were retained in the lambing bands. Of these 396 ewes, 90.4 per cent produced lambs as 3-year-olds, as compared with 92.4 per cent for the 3-year-old ewes which had lambled as 2-year-olds. From this showing it can be concluded that dryness in 2-year-old range Rambouillet ewes can not be taken as an indication of dryness in succeeding years, and that culling on that basis is unsound.

Consider now those ewes which failed, both as 2-year-olds and as 3-year-olds, to produce a lamb. During the 10-year period studied there were but 37 such ewes among the 2,009 sheep. Twenty-four were retained after culling, and 20 of the 24, or 83.3 per cent, produced lambs as 4-year-olds. This is a poorer showing by approximately 10 per cent than the lambing record of all the other 4-year-old ewes which had lambled previously, during either their first or second lambing seasons, or both.

### Other Factors More Important than Dryness

The number of ewes which were dry for two succeeding years may be too small to lend any great significance to their lambing percentage record as 4-year-olds. But it is interesting to note that of a total of 1,361 4-year-old ewes only four failed to produce lambs during at

least one of their first three lambing years. Furthermore, the record shows that of 768 ewes that were in the band for five consecutive lambing periods, those which failed to lamb the first year showed but slightly inferior records for the four succeeding lambing periods, than did those which lambed in their first year.

The conclusion seems warranted that such well-recognized factors as size, trueness to type, mutton quality, and character and weight of fleece deserve more consideration when culling the ewe flock than does the factor of previous dryness. In other words, a ewe of excellent individuality offers better promise of future performance for her owner, though she has failed to lamb as a 2-year-old, than does a distinctly inferior individual which has a lamb to her credit.

JOHN A. STOEHR, *Bureau of Animal Industry.*

**S**HEEP Improvement Through Breeding Is Demonstrated by U. S. Shropshire Flock Frequent inquiries received by the Department of Agriculture concerning its experiments dealing with sheep and wool production suggest the desirability of brief printed descriptions of its flocks. The 1927 Yearbook of Agriculture discussed the foundation flock used in developing the department's flock of Southdown sheep. Similarly the present account deals with the Shropshire flock maintained at the United States Animal Husbandry Experiment Farm at Beltsville, Md., which is about 13 miles from Washington, D. C. The portion of the farm devoted to sheep studies is designated as "Sheep Acres."

The original purchase of the department's foundation flock of Shropshire sheep was made in December, 1919, when eight select yearling ewes were obtained from the flock of W. G. Miles of Evansville, Wis. These ewes were of Bibby and Minton breeding, primarily, and were of excellent mutton conformation.

This small flock was increased in 1921 by a purchase of 12 ewes selected from a flock of 80 ewes which were being dispersed by Glimmerglen Farms, Cooperstown, N. Y. These ewes were largely of Duke of Westminster breeding, many of the ewes having been imported from that famous British flock. Other additions to the flock were made as follows: In the spring of 1924, six choice yearling ewes were purchased from Iroquois Farm, Cooperstown, N. Y. In 1927, 10 ewes of Buttar breeding were obtained, and in 1930 two Buttar and two Tanner ewes were obtained for the department by F. W. Harding of Waukesha, Wis. In all, 40 ewes have been purchased in the establishment of this flock. All were selected for their type, excellence of mutton conformation, and the desirable characteristics of their fleeces.

#### Two Rams Principally Used

The first two rams used in the flock were of Duke of Westminster breeding. These were followed by two rams obtained from Iroquois Farm, three imported Buttar rams, A. J. Moore No. 201, registration No. 599091 (fig. 125), and Broughton, No. 3921, registration No. 642591. The last two rams mentioned have been used most extensively and the ewes now in the flock are practically all sired by these rams. (Fig. 126.) Young rams sired by each of these rams are now being used to a limited extent in the flock.

In the development of this flock all the best ewe lambs have been retained for breeding stock, and about one-quarter of the entire flock is being replaced each year by the addition of yearling ewes. Of the 40 ewes purchased only 10 now remain in the flock, and only 8 of the original ewes have offspring in the flock. This number will no doubt

be further reduced as additional information is obtained on the offspring of many of those which still remain in the flock.



FIGURE 125—Stud ram A. J. Moore No. 201, used at the United States Animal Husbandry Experiment Farm, 1924 to 1930

### One Ewe Particularly Outstanding

Of all the ewes purchased, the one of outstanding merit was W. G. Miles No. 1031, registration No. 518-502, which is now represented in the flock by nine female offsprings and two stud rams. This ewe has

been able to produce offspring which were not only excellent themselves but which reproduced offspring also of such excellent type and conformation that they were retained in the breeding flock.

The purchase of foundation stock has now been discontinued and 25 per cent of the entire ewe flock traces directly to this ewe as well as



FIGURE 126—Yearling ewes added to the flock in 1926. The photograph was taken soon after shearing to show mutton conformation. These ewes were sired by the ram shown in Figure 125

to two stud rams. It is probable that in time the blood of this ewe will occur in the ancestry of the entire flock.

The flock now consists of 36 ewes, which are reasonably uniform and of a high degree of excellence in type and mutton form. The present superior merit of this flock has been developed through years of careful

selection and corrective matings on a basis of the production of sire and dam rather than on individual excellence of each parent.

C. G. POTTS, *Bureau of Animal Industry.*

**S**NAP-BEAN Seed Grown in West is Relatively Free of Blight and Anthracnose      The two most important diseases of beans, blight and anthracnose, are both seed-borne. If infected seed be planted and the weather conditions are at all favorable, the young seedlings may develop one or both of these diseases. From such seedlings the disease may spread to other plants and cause heavy losses to the crop. Blight occurs practically every year in most sections of the United States east of the Rocky Mountains, and to some extent in the Intermountain States of Colorado, Utah, Montana, and Wyoming, and to a very limited extent in Idaho. It rarely if ever occurs in California. Anthracnose is not so general in its distribution, being restricted largely to regions east of the Mississippi River. It is seldom found in Colorado or in any of the States farther west, and when it does occur it is never so prevalent as to be of consequence. Anthracnose occurs only in regions and during seasons having considerable rainfall and where the nights are cool, which explains why it may be present in some seasons and entirely absent in others.

Growing of bean seed by seedsmen for commercial purposes is largely confined to types used for canning and for market-garden purposes, that is, the snap beans. The dry-shell bean seed is mostly saved from the previous crop by the farmer growing it, and for that reason will not be taken into account in discussing sources of seed.

#### Grown in Widely Separated Regions

Snap-bean seed is grown in two widely separated regions of the United States, that is, in the East and in the West. In the East most of it is grown in Michigan and New York; in the West it is grown in Colorado, Wyoming, Montana, Idaho, Utah, a little in California, and to a lesser extent in some of the other States.

Eastern-grown seed is likely to be affected with blight every year, and by anthracnose if conditions are favorable for its development. A study of these two diseases over a period of years has shown that blight has occasionally occurred in an epidemic form in some of the Western States, but anthracnose never. The blight occurs much less frequently in the West than in the East and year after year is much less of a hazard.

Investigations during several years have developed the fact that western-grown seed gives a much cleaner crop than seed grown in the East, even though it is planted in regions where blight and anthracnose are prevalent.

In view of the fact that these two diseases are seed-borne, and that cleaner seed is being grown in the West, the canners, market gardeners, and those requiring bean seed for planting are advised to procure if possible seed grown in the Western States. In spite of the fact that blight sometimes occurs in some of the Western States, it is less prevalent there than in the East.

Information on the condition of the crop with respect to blight and anthracnose can usually be obtained from the agricultural colleges and experiment stations in the different States.

L. L. HARTER, *Bureau of Plant Industry.*

## **S**NOW Removal on Farm Roads Easily Effected With Simple Equipment

All of the main roads and a great many feeder roads in the farming regions are now kept free of snow throughout the winter, according to reports of States in the snow area. Many farmers do not live directly on such roads and must clear their own outlets if they wish to use the highways during the snow season.

Few farms are without a truck or tractor which can be used in clearing snow from farm roads. A snowplow of low cost can be purchased or made and mounted on the machine by a simple attachment. Snow 12 or 15 inches deep can be cleared by a truck at an average speed of 12 to 15 miles an hour while a tractor can move snow while traveling at its maximum normal speed.

Plows of the straight-blade type or V-shape type can be used. The V-type plow is considered by many as more serviceable in opening the initial cut, while the straight-blade plow is believed better in widening work. The V-type plow is difficult to build because of its curved or concave surfaces, and, therefore should be purchased, but the straight-

blade plow can be built locally either from wood or metal. Either plow should be between 12 and 15 inches high.

Figure 127 shows a homemade snowplow made of scrap steel and attached to a truck by a bolt through the angle iron of the body frame on each side of the truck, the bolts arranged to act as hinges.

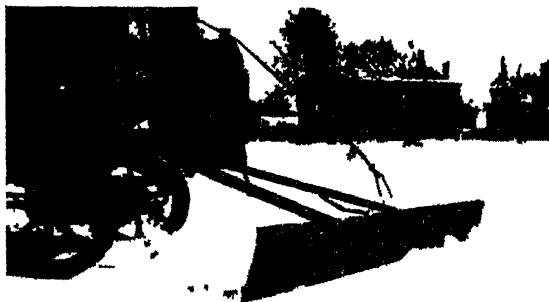


FIGURE 127—The improved snow plow in working position

One end of a cable is attached to the plow blade and the other end fastened to a light set of chain blocks attached to the truck body. With this arrangement the plow blade can be suspended about 1 inch above the surface being cleared. Such plows are very serviceable when mounted on trucks or tractors, and in some instances have been used on automobiles.

### **Two Methods of Snow Clearing**

Variable snowfall conditions and differences in personal judgment have resulted in different procedures in snow removal. One method is to start work shortly after the storm commences and to continue moving snow until the snowfall stops and the road is cleared. Another method is to delay operation during the greatest intensity of the storm and then to commence snow removal. An advantage of the first method is that deep snow is not permitted to accumulate; but working while the storm is raging is generally hard on the operator, and if the wind is blowing there may be drifting on the cleared roadway. If the clearing is delayed until the storm is over, the removal should be started before the snow has become hard by settling, packing by traffic, or by freezing. At the beginning of the snow season the area cleared should be made sufficiently wide to provide room for the storage of snow from later storms.

The equipment described is capable of displacing newly fallen snow several inches deep and Weather Bureau records show that except in mountainous regions snow seldom falls to depths greater than 9 inches even in the heavy snowfall area of the country. Disregarding snowfall less than 2 inches deep, the greater number of storms deposit snow between 2 and 5 inches deep, with snowfalls 5 to 7 inches deep comparatively infrequent. If snow lies as it falls, little effort is necessary in its removal. But snowfall is usually accompanied or followed by high winds which buffet the snow crystals about, and where obstacles are encountered, drifts are formed. Obstacles break the force of the wind and reduce its velocity. Pockets of comparatively still air are formed to the lee of the obstacles. These pockets permit the snowflakes to fall and create deep drifts which at times are difficult to handle. Obstacles close to the road may cause drifting on the surface while those at some distance to windward may give protection by collecting the loose and drifting snow. Hedges near the road, tight or partly tight fences or gates, standing weeds, and other vegetation often produce drifting. Figures 128 and 129 show slight drifting resulting from weed growth and a farm gate. The drifts shown are not troublesome, but the views plainly illustrate the theory of drift formation.



FIGURE 128 — Minor drifting conditions caused by standing weeds

### Many Causes of Drifts May Be Removed

In preparing a farm road or lane for the winter, all causes of drifts should be eliminated where possible, or if necessary, artificial wind-

breaks established. A study of the location should be made and where snow usually piles up, all weeds and other vegetation should be cut and removed from the vicinity and all obstructing board fences and gates should be dismantled at least for the snow season.

Where artificial preventive measures are adopted, structures



FIGURE 129 — Slight drifting caused by a gate

should be so placed as to form eddies on the windward side of the road at a sufficient distance to permit the blowing snow to be deposited between the structure and the road. Such structures are called snow fences

and are built of various materials and of many designs. One type consists of woven-wire pickets, hung on light iron posts which are driven into the ground. A row of evergreen saplings is often adequate protection. The saplings are cut and the sharpened ends inserted in the ground before it freezes.

Snow fences are placed from 50 to 150 feet away from the road according to the slope of the ground. For convenience, the fences are usually placed parallel to the road. The fences can be installed in the fall after the farm work for the season is ended, and dismantled in the spring before the start of summer activities.

Slippery surfaces often form on road surfaces which have been cleared by plows. A thin layer of snow is left on the traveled way by the snow-plow, or a light snowfall occurs and the compression caused by traffic, combined with alternate freezing and thawing, results in an icy and dangerous surface. Such a condition is particularly dangerous at curves, on sidehill roadways, and on steep grades. Spreading sand, cinders, stone, or slag chips over the slippery areas is helpful in roughening the surface and preventing skidding. However, it is often found that the wind very quickly blows the material off the roadway or it slides with the wheels when brakes are applied, making replacement necessary at frequent intervals. To overcome such conditions, small quantities of coarse-grained salt can be mixed with the grit. The salt causes the angular particles to penetrate the icy formation, providing a nonskid surface with lasting qualities. Granular material for such use should be protected from moisture and freezing so that it can be readily spread when needed.

H. G. McKELVEY, *Bureau of Public Roads.*

## **S**OIL-EROSION Problem Under Investigation in National Control Program

Erosional wastage of soil and excessive loss of rain water from unprotected cultivated slopes and from overgrazed as well as rodent-infested ranges and pastures have come to be recognized as American economic problems of grave national importance. The two processes of wastage go hand in hand, and the resulting evils are manifold. Not only is the productive topsoil being thinned by the unceasing attack of run-off water, but it is being swept away completely from countless slopes, leaving behind it subsoil which invariably is less productive and usually is more difficult and costly to till. In many instances, after the washing off of this vitally important humus layer and then of the layers beneath, the exposed material in numerous parts of the country erodes faster than the upper soil layers. Also, the exposed subsoil of many types of land is less absorptive of rain water than was the soil removed by washing, and is less retentive of the water which is absorbed, the clayey material so often exposed being more impervious when wet and more susceptible to hardening, cracking, and loss of moisture on drying.

In many localities, as the result of prolonged erosion, increased amounts of solid soil matter, dissolved constituents, suspended colloids, and water are being swept into the valleys and into stream channels, drainage and irrigation canals and ditches, reservoirs, lakes, and harbors. Lower slopes and alluvial plains are being covered on a large scale by soil started toward the sea, but stranded somewhere en route

The coarser of these sediments are injuring fields, meadows, woodlands, and protective brush and grass-covered areas. Frequently, they consist of sand and gravel having either no crop-producing value or a tremendously reduced crop-producing value as compared with the soil buried by them. Moreover, the richer deposits of erosional débris frequently are dropped over the flood plains of streams, in depressions and on lower slopes where the land is already deep and rich, needing no additional soil material.

With the clogging of stream channels, formerly cultivable fields are made uncultivable or useless by reason of the increased frequency and duration of overflows. Indeed, some millions of acres of formerly tilled stream-bottom land have thus been converted into marshland and near-marshland of small value.



FIGURE 130—In left background, exceedingly poor corn on stiff clay subsoil of Shelby loam, from which the productive top-soil has been entirely removed by sheet erosion. Foreground shows corn buried by products of erosion in a depression that needed no additional soil material. Corn Belt, northern Missouri.

### Gullying Causes Added Damage

In its effects on agricultural and pastoral lands, the maleficence of erosion over many millions of acres does not stop merely with the planing off of the upper soil layers, changing vast areas from productive mellow loams, silt loams, and sandy loams to relatively unproductive, intractable clays and clay loams (fig. 130); but goes on to the point of ruining valuable lands by gullying, even destroying them so far as cultivation is concerned. This insidious dissection proceeds with such rapidity in some of the more vulnerable regions of the country that control measures scarcely come within the scope of practical farm operation, especially where procrastination has permitted the gullies to dig deeply into the less stable substrata characterizing many types of soil. On some steeply sloping lands, gullies cut down to bedrock within four or five years after the removal of the virgin cover of timber, grass, or chaparral. Observation and surveys indicate that erosion, accelerated by the intervention of man's agricultural and livestock operations, is affecting not less than 75 per cent of all the land

in cultivation in the United States; and that impoverishing washing, with its attending diminution of the growth of nutritious grazing plants, is affecting between 75 and 90 per cent of the western ranges and a considerable part of the pastures and ranges of the more humid regions. The greater part of this is sheet erosion, which takes a part of the topsoil whenever there is rain enough to cause water to run downhill. Some 17,500,000 acres, at least, of formerly cultivated land in this country have been essentially ruined by gulying, and between 4,000,000 and 5,000,000 acres of alluvial land have practically been despoiled by overwash and increased swampiness resulting from the clogging of stream channels with eroded matter, according to surveys and observations.

The damage of erosion varies greatly, as a matter of course, because of differences in soil, slope, character and amount of rainfall, vegetative cover, and past and present usage. Soils high in content of silt, sandy loams, and loams overlying less absorptive clay layers; clays



FIGURE 131.—Recently formed gully in bean district southeast of Santa Barbara, Calif. Sheet erosion also is destructive in this region

that undergo marked granulation and fragmentation on drying; and practically all soils of low organic-matter content are especially susceptible to rapid wastage by sheet erosion. Soils with substrata of a less stable character than the overlying layers, such as those having loose, sandy, and gravelly beds and soft, silty layers, and decomposed (rotten) rock in their lower depths, suffer more

disastrously from deep-going and rapidly extending gullies than do those types having clay and silty layers of good permeability beneath their upper layers. Soils with impervious sublayers (fig. 131) are far more erosive than those with permeable substrata, that is, where the lower beds do not consist of excessively fragile materials, such as melt away in contact with flowing water somewhat in the manner of sugar. The steeper areas, of course, are usually more erosive, where the soil and soil treatment are comparable, as are, also, the less densely vegetated areas and soils kept loose at the surface by shallow cultivation and excessive trampling of stock. There are exceptions to these general characterizations, but they are not important.

### Plans for Experimentation

The wide differences in susceptibility to destructive washing, due to such variables as those referred to and, in some instances, to the manner in which erosion proceeds (erosion types), necessitate the use of various control measures in attempts to slow down or control the washing. Regions of heavy rainfall characterized by hard showers are likely to call for control measures which may or may not prove

practicable when applied to other regions where the total precipitation is lighter and the rains fall more gently. Erosion by melting snow may not necessarily call for precisely the same means of control as that caused by torrential rainfall.

Where the primary object is to conserve water, still different methods of procedure may be required. Where wind is the chief factor or a markedly important factor in soil removal, yet other methods, such as vegetative windbreaks or fences placed at right angles to the prevailing direction of wind may be required. The effects of gravitational creep, sliding, and soil fragmentation may also call for special control measures. Widely trenching gullies with caving walls, such as characterize soils having loose or soft substrata, require different types of control dams from those required by the V-shaped gulleys which characteristically form in stiff, impermeable clays. Areas subject to rill washing, as distinguished from the more even plantation effects of sheet erosion, seemingly can not be controlled by precisely the same methods as those employed in handling the latter type of washing.

### Many Different Measures Necessary

Accordingly, the problem of erosion control and water conservation is not one in which a few simple methods of attack are likely to give widespread results of a satisfactory nature. Indeed, the process is so varied from place to place, because of natural and induced variables, that any effective control obviously will require the use of many different measures. So little attention has been devoted to the problem of land impairment by excessive washing, even though it doubtless exceeds the impairment caused by all the other agencies (of human intervention) affecting soil productivity, that we stand to-day essentially at the threshold of endeavor toward clear understanding of erosional processes and toward development of practical methods of erosion control applicable to the multitude of factors affecting the problem—such factors as soil, climate, topography, vegetation, and land usage. Until recently, quantitative data dealing with erosion and run-off, as affected by these variables, were almost completely lacking. Even now, little is known either as to the rate or type of erosion for most soils, particularly as they occur on different slopes, under different cropping systems. These fundamental data are vitally essential in connection with any sound understanding of the processes involved and with any certainty of procedure in the matter of control measures.

It was not until recently that unnatural or abnormal erosion, as distinguished from the much slower and less vicious soil washing which goes on under natural or normal conditions of ground cover and soil structure, was clearly defined. Broadly speaking, the former type of washing, that is, man-induced or man-accentuated erosion, was looked upon, until lately, as belonging to the natural order of erosional activities. As a matter of emphasis, it may not, perhaps, be amiss to repeat what has already been inferred, namely, that the national program of soil and water conservation, with which this article is concerned, relates primarily to the abnormal phase of soil erosion (fig. 132)—that which results from the activities of man and his domestic animals in breaking down natural soil conditions and stabilizers through the complete or excessive removal of vegetation and the disruption or destruction of the normal or natural soil structure by cul-

tivation, trampling, and other means. And, too, it may be well to emphasize the point that this national program is concerned chiefly with soil and water conservation, rather than with reclamation of areas already despoiled; although, of course, efforts will be made to determine the cost and feasibility of reclaiming such devastated lands.

### Methods of Control

Fortunately, experiments aimed at determining the principles underlying soil-erosion processes will, in a considerable degree, reveal, concomitantly, methods of land use which are likely to prove most effective in slowing down excessive soil losses by washing. In other words, the methods of research employed are likely to be, necessarily, demonstrational as well as investigational in character, at least in a considerable number of instances.



FIGURE 132—Terrific sheet erosion in Texas black land cotton field caused by one rain, on May 10, 1930. The cotton was up at the time of this rain, but most of it was washed out. The loss of soil by this one rain (from the same soil and slope as in this field) at the near-by Temple Experiment Station, as actually measured, amounted to 23 tons per acre.

From what has been said in regard to the variables of erosion, the investigations manifestly must be carried out on a regional basis, that is, on the basis of the major agricultural soils or soil groups of the country and the major climatic zones. The subordinate variables, such as slope and condition of the soil as affected by different methods of use, must, of course, be given due consideration. The latter, though varying widely within narrow limits, may be classed as local variables, rather than regional, since they may affect most of the regions in more or less the same manner though not necessarily in the same degree.

The major problems as affected by these variables will be attacked first, according to the national program of soil and water conservation as at present outlined, and under as nearly average or representative conditions for the more important regions of distress as may be scientifically practicable. Naturally, the soil saving will be emphasized in those more humid regions where soil losses are of more importance to the users of land than are water losses. Conversely, the saving of water will be given most consideration in those dry regions where the amount of rainfall loss by run-off frequently determines the failure or success of an agricultural enterprise. Some modifications of this general plan of attack may be necessary in those relatively dry regions where soil shifting by wind is of greater concern to the farmer than are losses of water and soil in the run-off.

## Outline of the National Program

The national plan for soil and water conservation calls for the establishment of experiment stations in more than 20 major regions throughout the country. (Fig. 133) Figure 133, however, does not show the location of the experimental investigations being carried on in this connection by the Forest Service on the grazing and forestry lands, but only those pertaining to the farm lands. At these stations every promising, practical means of slowing down excessive run-off and wash-off, such as terracing, building inexpensive dams, crop rotations, strip cropping with and without terraces, subsoiling, strip subsoiling, surface cupping, and the use of living dams and soil-holding vines and grasses, is to be thoroughly tested on a field scale.

The program of investigations as outlined by those who have critically studied the numerous variables and objectives involved, comprises investigations in the fields of soil science, agricultural engineering, and

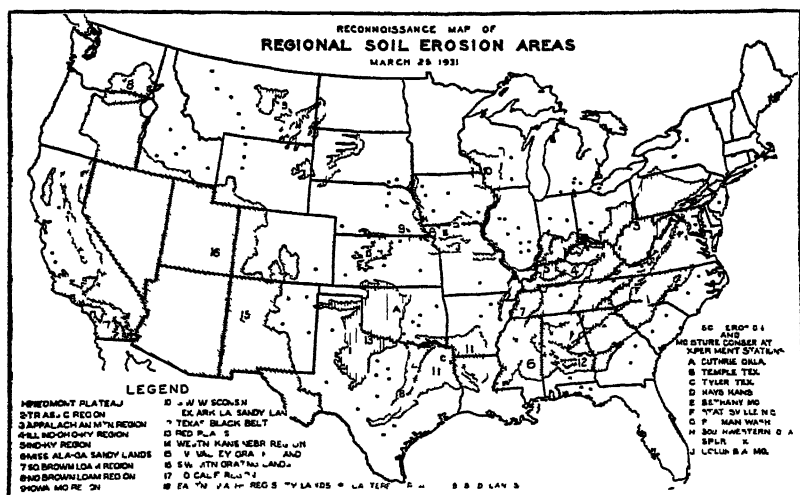


FIGURE 133 — Map showing regional soil erosion areas in the United States, March 25, 1931

forestry. It is impractical, in fact impossible, to draw sharp lines of separation between the studies in these different branches, and the program has been arranged on the basis that specialists in each field shall contribute, cooperatively, the fullest possible measure of technical and practical help. Each of the various problems will be investigated from as many angles as may be necessary to a clear understanding of the processes involved in the removal of soil by flowing water and in the control of the flow to prevent erosion and to induce absorption of the water by the soil.

Owing to space limitations, it is impossible to enumerate here the many experiments being carried on at the eight experiment stations now in operation. The starting points of various experiments are to be process studies, quantitative measurements, and preventive measures as influenced by soil, degree of slope, length of slope, crop, cropping system, vegetation, amount and character of rainfall, seasonal conditions, tillage methods, grazing, burning, lumbering, and use of fertilizers.

### Surveys

Necessary detailed and reconnaissance surveys are to be made of small plats, large fields, farms, drainage basins, and valley areas receiving deposits of erosional debris from crop lands, grazing and timber lands, and protection areas or areas under protection for the purpose of regulating stream flow, prevention of excessive silting of reservoirs, lakes, and harbors.

### Education and Extension Activities

It is proposed to carry on programs of education and extension work in order to arouse land users, the Nation, States, counties, and business men to the seriousness of the problem of erosion, its meaning and cost; to point out the necessity for employing practical methods of control, emphasizing the fact that erosion is a business problem which must be solved now, and not one that can be put off for future generations to take care of; and to carry direct to the farmers those practical results worked out at the regional soil-erosion and moisture-conservation experiment stations which have been proved to be applicable to their local conditions. The problem of conserving more of the rainfall by causing more of it to sink into the ground where it falls and by diverting and spreading the run-off so as to apply it economically to lower-lying areas according to the water needs of such areas, will be emphasized, and any experimental results of proved practical value in this connection will be carried to the users of the lands in each region. This problem of saving more of the rainfall, of course, applies chiefly to areas characterized by low precipitation, particularly to farms and ranges within and to the west of the Great Plains.

Dissemination of the facts relating to the causal and identifiable aspects of erosion, as well as to the cost of erosion in general and specific terms of land impoverished or destroyed, and the carrying of experimental results pertaining to practical methods of control and prevention directly to the land users concerned, can probably best be accomplished through the medium of the Federal and State extension and information services, the State colleges of agriculture and experiment stations; by the encouragement of visits to the erosion and moisture conservation experiment stations on the part of farmers, business men, teachers, and students; by publication and wide distribution of departmental and State bulletins, circulars, and progress reports; by newspaper, magazine, and farm-journal articles; and by illustrated lectures.

### Cost of Preventive Measures to be Studied

It is proposed under the national program of soil and water conservation to determine the efficacy, practicability, and cost of all promising means of prevention, control, and reduction of erosion and excessive run-off of rainwater, and to carry the results to those users of the land according to the specific needs and adaptabilities of their soils. Obviously, it is not going to be possible to work out all the details of such a comprehensive program at once. The various research projects and required experimental installations will be taken up in an orderly manner, in accordance with their apparent importance, when and so far as circumstances permit. This is a new field of research; in order

to carry it ahead in the most efficient manner, new methods of procedure and technical equipment must be worked out.

It will be readily recognized by all who look searchingly into the problem of erosion that it embraces so many variables, so intricately interdependent, that time, patience, and a high degree of technical efficiency will be required to solve the problem in all of its varied ramifications. That this will be accomplished wholly or in a large degree is indicated by the good progress already made at the eight established stations.

H. H. BENNETT, *Bureau of Chemistry and Soils.*

## STATE Experiment Stations Win Useful Results in Agricultural Engineering

The investigations in agricultural engineering at the State agricultural experiment stations have been built consistently around the problems of primary importance to the agriculture of each State, and have undergone a gradual but sound development during recent years. As progress has been made and a better understanding gained of the field and technic of these investigations, the application of engineering principles to agricultural practices has been accomplished to an extent which has considerably increased efficiency in several lines of production. High standards of scientific investigation in this field have been identical with high standards of practical service, and results which are of considerable practical utility to the agriculture of the different States have been secured.

These investigations have aligned themselves into certain general fields. These fields include farm power and machinery, farm structures, land reclamation and improvement, and rural electrification.

Perhaps the biggest returns in increased economy in production and greater efficiency per agricultural worker have been realized from the investigations in the power and machinery field. The items of power and labor in agricultural production are tremendous and have been estimated as varying in cost from 45 to 65 per cent of the total cost of production of the more important crops. The development of the important specific details of mechanical methods and equipment for seed-bed preparation, planting, cultivation, and harvesting especially, has been productive of cost-saving improvements. Thus important returns in the form of more efficient and labor-saving machinery and methods for the preparation and cultivation of cotton soils have been realized from the studies of the mechanics of tillage at the Alabama Agricultural Experiment Station, for example. Similar results have been obtained with reference to the preparation and cultivation of soils for the corn crop by several of the Corn Belt stations. Equipment and methods which permit the economical and proper planting and fertilization of the corn and cotton crops in one mechanical operation also have been developed. They save time and labor and result in a better crop stand.

### Efficient Use of Traction

Much also has been accomplished in the more efficient use of animals for draft power and in the development of power draft machines and their adaptation to medium-sized farms. Practical devices have been produced wherewith the maximum draft power from animals of different numbers and weights can be secured and most efficiently used, and

these devices have been adapted economically to different draft operations on the farm.

The tractor in its earlier stages was frequently neither efficiently nor economically adaptable to the peculiar and sometimes very severe conditions of agricultural service, and it became necessary to modify and develop it in some of its more important operations, such as driving, steering, traction, and lubrication. As a result it is becoming a very useful farm machine for both belt and draft power purposes, especially in the general-purpose types. It is now possible, for example, to use tractors in field operations on some of the more difficult soils without the large losses of power through wheel slippage previously experienced. This has resulted from the development of drive-wheel design, notably by the Alabama station. The development and modification of tractor engines, especially at the California station, resulting in dust elimination and more efficient bearing lubrication, have materially reduced the cost of maintaining tractors used in farming operations. Better adaptation of the tractor to definite sizes and systems of farming has been accomplished to good advantage, notably by the Montana station. As a whole the tractor has been developed into a time and labor saving machine which, when properly supplemented by animal power, is becoming useful and profitable in many activities of both general and specialized types of farming.

### Harvesting Losses Reduced

Developments of a similar practical character have taken place in harvesting and threshing machinery. The older methods were wasteful of time, labor, power, and grain. Much was accomplished along cost-saving lines by the practical combination of the grain harvesting and threshing operations, although the losses of grain were still high. The further development of equipment and methods by such stations as those in California, Illinois, Minnesota, North Dakota, and Pennsylvania, for example, resulted in material reduction of previous large losses of grain and increased economy in power and labor. Progress also has been made in the artificial drying of the green combined grain until it has become possible in several localities to place a product of satisfactory quality in storage after combining.

Frequent large losses of hay and other forage crops through inclement weather, especially in the more humid regions, also have prompted the stations to investigate the possibility of artificially curing such crops. As a result considerable success has been attained, notably by the Louisiana station, in developing equipment and methods for artificially curing such forage crops as alfalfa, soybeans, and the like, and at the same time maintaining their superior quality.

In the field of farm structures, numerous practical developments have resulted not only in structural soundness, fireproofness, durability, and economy of farm buildings but in their internal arrangement to produce optimum conditions for the storage of fruits, vegetables, and other crops, and for the housing of dairy and other livestock and poultry. Thus durable, economical, and sanitary dairy and livestock structures have been developed to meet the needs of agriculture in several of the States, and poultry structures have been improved along sanitary and cost-saving lines which also have favored optimum production. Much has been done toward the development of economical and effective grain storages, notably by the Kansas station, and the

way toward improved apple storages has been pointed in several of the leading apple-producing States.

The station investigations relating to land reclamation and improvement have been equally productive of useful results. Important among the achievements in this line have been the establishment of practical and economical methods of stump burning and removal, notably by the California, Oregon, Washington, and Minnesota stations. The use of explosives for clearing land of stumps and bowlders and for the quick and economical excavation of drainage channels in swampy soils has also been developed to an eminent degree, especially by the Michigan and Alabama stations.

### More Effective Irrigation Methods

The older methods of irrigation were frequently wasteful of both labor and water, and the stations in the arid and semiarid States have expended considerable effort to introduce greater economy and effectiveness into these practices. Much more economical and effective methods of using water in irrigation agriculture are now available, and considerable equipment for its precise measurement and control has been provided.

In the past, soil-erosion prevention measures were largely of a speculative character and frequently were expensive and not very effective or permanent. Considerable improvement has been made and much engineering precision has been introduced into methods of terracing, soil-saving dam construction, gully obstructing, and similar measures for the control of soil erosion and the conservation of storm run-off water, especially by the Texas, Oklahoma, and Missouri stations. The cost of these measures on the acre basis has been brought down to a very reasonable amount.

The somewhat recent widespread movement to introduce electricity into agricultural operations has prompted several of the stations to undertake investigations along specific lines, and already much information of practical utility has been secured. For example, electrical feed grinding, silage cutting, and other forage-processing methods have been developed along cost-saving lines, and the electrical brooding of young chickens has reached a practical stage in several States. Electrical refrigeration and milk processing have been developed along lines of utility and economy, notably by the New Hampshire station, and dairy-utensil sterilization, poultry-house lighting, and milking are other important features of farming to which electricity has been applied in a useful and profitable manner. These investigations have the well-established background of the electrical industry at their disposal and much progress has been made in lightening several agricultural burdens.

Thus the agricultural-engineering investigations at the experiment stations have established their place and demonstrated their worth in the agricultural programs of the different States. They have supplied numerous mechanical and structural means of securing higher-quality farm products with less labor and at lower costs. They have thereby assisted materially in laying the foundations of a civilization which no longer recognizes or tolerates the agricultural burdens and drudgery of preceding generations, and which considers the farm as an industrial unit as well as a home.

ROBERT W. TRULLINGER, *Office of Experiment Stations.*

**STINKING-SMUT Control Through Seed Treatment Urged by Extension Men** Estimates of field losses and market discounts indicate that during the past 10 years there has been a general increase in stinking smut of wheat in the United States. At the present time the losses for the country as a whole are apparently on the downward trend, but from 1922 to 1926 they were decidedly upward. There are certain wheat areas, such as the spring-wheat States and the intermountain area of Utah and Idaho, where the losses still seem to be tending upward.

One of the most important reasons for the increase and continued severity of stinking smut is the appearance of new physiological or supervirulent forms of the smut fungus which have attacked more or less resistant varieties of wheat, causing heavy loss. Some of these distinct forms or races have been known in other countries for several years, and it is suspected that the great exchanges of seed wheat during and following the World War may have brought about their introduction and subsequent increase and spread. Recently, in the spring-wheat area, durum wheat, which



FIGURE 134—Aside from providing information needed as a basis for control work, the wheat-smut survey offers an excellent opportunity for personal contact with growers. The symptoms and losses can be shown to them and preventive measures explained.

prior to 1925 showed practically no smut, has become very badly affected. Also the popular spring wheat Marquis, hitherto highly resistant, is now showing increasing amounts of smut. There is every indication that growers now have to deal with several forms of smut instead of with two, as was formerly supposed, and that the problem of control has been made more difficult. Adjustments in farm practices and changes of varieties become necessary. Naturally these adjustments and changes come about slowly.

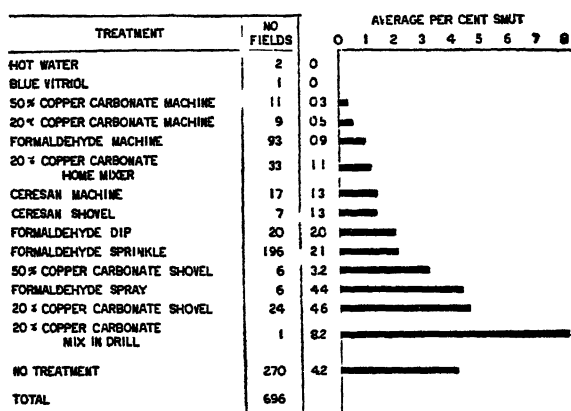
In an effort to throw further light on the reasons for the continued prevalence of smut in spring wheat, a survey (fig. 134) was conducted in 1930 covering 17 counties in 4 States. The principal objects were to find out how extensively seed treatment was being practiced; to determine more accurately the results being obtained by seed treatment; and to study the methods being followed. It was found that seed treatment was being used by only about two-thirds of the farmers in the area covered. It was further determined that satisfactory results were not being obtained by many of those who practiced seed treatment. For instance, in the 434 fields of treated seed there was considerable smut, averaging 2 per cent, while in the 270 untreated fields there was an average of 4 per cent smut.

## Faulty Methods Largely Responsible

A study of the reasons for failure to control led to the conclusion that faulty methods were largely responsible. In many cases the seed had not been thoroughly cleaned to remove smut balls. Also, the disinfectants used, either liquid or dust, had not always been thoroughly or properly applied. The result of the study of the methods bore out the conclusions reached earlier through experimentation that the most effective preventives were copper carbonate, either the 50 or 20 per cent grades, formaldehyde used according to the soaking and skimming method, and organic mercury dusts, all applied with efficient homemade or commercial machines. The same chemicals applied by sprinkling and shoveling methods were in general unsatisfactory. To control smut, it is not only necessary for more farmers to clean and treat their seed, but for those who do treat it to perform better and more effective work.

With the increase of stinking smut in recent years there has been an extension of research and control activities by the States and by the United States Department of Agriculture. Special literature has been prepared and distributed. County agents have conducted many demonstrations showing methods of treatment and the results. Several railroads have run demonstration trains emphasizing smut control. More elevator operators have become interested and have cooperated by making treating machines and chemicals available, and by adopting the practice of buying wheat on a quality and grade basis with discounts for smut. Community seed cleaning and treating outfits, either stationary or portable, have been operated in many counties, in most cases with good results. (Fig. 135.)

Some of the best examples of successful operation of portable community cleaning and treating outfits are found in California. In that State the use of copper carbonate has now become a general practice. In 1925 and 1926, 26 and 16 per cent of the cars received on the Los Angeles grain exchange graded smutty. About that time one of the counties started a portable cleaning and treating outfit. In one 20-day period it cleaned and treated for 134 growers, 35,000 bushels of grain, mostly wheat, which represented about four-fifths of the total seed grain used in the county. The average cost for the work was about 6 cents per bushel. Following this successful experience other counties began operating similar outfits and to-day many are being used in the State. A study of the report of the Los Angeles grain exchange for



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FIGURE 135.—Relative effectiveness of different methods of treating spring-wheat seed, as shown by a survey in 1930

smutty California wheat being received there shows that in 1929, 7 per cent, and in 1930, 1 per cent of the carloads, were classed as smutty.

### Progress in Kansas and Pennsylvania

Kansas and Pennsylvania have each made marked progress in controlling smut during recent years. The former has just completed a 5-year program for wheat improvement which included seed treatment for smut prevention. The use of copper carbonate dust in Kansas has gradually been extended until in 1930 somewhat more than 2,000,000 acres were sown with treated seed. In 1926 the estimated loss in yield from smut was 10 per cent, while in 1930 the estimate was not over 2 per cent. Seed-treatment campaigns in Pennsylvania have



FIGURE 1-6—Smutty wheat below, smut-free wheat above. The smutty sample shows both broken and unbroken smut-billed and smut spores smeared over the outside of sound kernels. Thorough cleaning to remove smut-billed bills should precede seed treatment.

accomplished a gradual reduction in smut from 6 and 7 per cent during 1926 and 1927 to less than 1 per cent in 1930.

In the spring-wheat States the community treating outfit which is proving so satisfactory in California is not so practicable. The wet roads in the spring interfere somewhat with hauling wheat to a central treating plant, or the farm-to-farm operation of a portable outfit. However, there have been several instances of success with community treatment. At Hanley Falls, Minn., for instance, wheat had been very smutty previous to 1928. During that year an elevator manager purchased several seed-treating machines. Some of the smaller ones he rented to farmers at a small daily charge while a large-capacity machine served those who brought in their seed. The results were very striking, for in 1929 no smut was found in the first 20 carloads shipped out. Several spring-wheat counties have made progress in

control as a result of intensive work. Among these, Brown County, S. Dak., stands out prominently. In 1928 Brown County was one of the smuttiest counties in South Dakota, 41.5 per cent of the carload receipts at Minneapolis grading smutty. In the winter of 1928-29 a campaign for control was started with the result that the 1929 crop from the county graded only 17 per cent smutty and in 1930 a still further reduction occurred in spite of the general increase of smut in the entire spring-wheat area.

In the extension work for 1931 greater emphasis was placed on better and more efficient cleaning of seed to remove smut balls and on better and more efficient treating methods. (Fig. 136.) The use of sprinkling and shoveling methods was discouraged and the importance of good machines of the right type was emphasized. Where practical, the use of community cleaning and treating equipment was advised. The control of smut on a large scale is not so easy as one might suppose, and when attempted in a small way often results in failure. Therefore, in States where smut is a real problem, county agents are now being encouraged to put on intensive control campaigns making full use of demonstrations, surveys, meetings, tours, contests, news services, and other recognized extension means and agencies.

R. J. HASKELL, *Extension Service.*

**STRAWBERRY-BUD Formation** Investigations on the time of  
**Is Favorably Influenced** fruit-bud formation in straw-  
**By Temperature and Light** berries were begun more than  
 30 years ago by Goff in Wisconsin. He found that such formation began there during September. Since that time other investigators have found that this date is approximately correct for latitudes near to that of Wisconsin. Recent studies, however, have shown that there is considerable difference among the different varieties as regards time when fruit-bud differentiation is first evident and also in regard to the subsequent rate at which development takes place. The Howard 17 in the Eastern States and the Marshall in the Pacific Coast States start forming fruit buds early in September, whereas the Southland in the East and Ettersburg 121 in the Pacific Northwest do not begin until about November 1. The development of the fruit buds of the Missionary seems to proceed much more slowly than in the Dunlap, although both begin fruit-bud differentiation at about the same time.

Some information on the effect of different growing conditions upon fruit-bud development is now available; furthermore, the influence of the drought of 1930 revealed some interesting facts. In Maryland, plants severely weakened by the drought showed no signs of fruit-bud development and produced no berries. The light, late fall rains were not sufficient to start fruit-bud formation, and the crop in the spring of 1931 was very light. A few drought-resisting varieties were vigorous enough to form some fruit buds and to produce a fair crop. In North Carolina the drought also weakened the plants so that fall fruit-bud formation was much less than usual and a light "ground crop" of fruit resulted. However, owing to the mildness of the winter and early spring, fruit-bud formation took place then in all well-rooted plants, and a heavy "crown crop" of fruit resulted.

### Two Peak Periods in South

In the Southern States, from about the Virginia-North Carolina line southward to northern Florida, there are two peak periods in the strawberry season. The first crop, known as the ground crop, is borne on fruit stalks that branch basally; the second, known as the crown crop, is borne on long fruit stalks that branch at a considerable distance from the base. These two peak periods of production are accounted for by the fact that fruit-bud formation takes place under Coastal Plain conditions in North Carolina and southward in autumn, to some extent during the winter, and in spring. The ground crop (called crown crop in Louisiana) develops from fruit buds that form in the fall. The crown crop (called limb crop in Louisiana) develops from fruit buds that form later than those that develop into the ground crop, even as late as April and May while the crop is ripening. The relative time of ripening and the amount of the ground and crown crops depend on the vigor of the plants, especially in the fall, and on the weather conditions during the fall, winter, and spring. Strawberry plants must be vigorous during the fall period in order to produce a large early ground crop. In North Carolina, in many seasons at least, if there is a large early ground crop, the crown crop seems relatively late. In an open winter many of the buds develop until they are caught by freezes and killed; in closed winters the buds are more dormant and the ground crop is large.

The long season of fruit production in Florida seems to be due to the formation of fruit buds going on almost continuously throughout the winter and spring but gradually coming to an end when the summer temperatures become high.

In districts of California just south of San Francisco, fruit is produced from April to December by varieties which in other parts of the United States produce but a single crop. Conditions in these California sections seem favorable to fruit-bud formation in the same way that winter conditions in Florida favor continuous fruit-bud differentiation.

In western Oregon the Marshall variety begins to form fruit buds in the old crowns about September 1. In the same region the Ettersburg 121 variety does not begin to form buds until about November 1, but it continues to grow and develop fruit buds later than the Marshall, the top of which becomes dormant as soon as freezing weather occurs. The Oregon State Experiment Station has found that very large increases in yield result from irrigation of the Marshall, but in many years at least, no increase results from irrigation of the Ettersburg 121. The explanation of this is that much more vigorous plants are produced by summer irrigation of the Marshall, so that more fruit buds can form in September and later. Vigorous growth of the Ettersburg 121 follows the advent of the fall rains, so that extensive fruit-bud formation can take place after November 1.

### Runner Production in Spring Varieties

Spring-bearing varieties produce runners and new runner plants when the long daily light periods of summer occur, but when shorter daily light periods prevail in the fall, runner production slows up and fruit-bud formation takes place. In Florida under the short days of winter, fruit-bud formation is continuous and very few runners are produced.

In the California districts fruit buds start forming when the daylight periods of fall become short, and owing to mild weather, fruit buds there continue to form all winter. The spring and summer days in central California are relatively short, as compared with those in Northern States, and in districts near the coast are relatively cool, and fruit-bud formation continues throughout the summer.

Owing to inherent characteristics, everbearing strawberries produce fruit buds only when long daily light periods occur or have just preceded fruit-bud development. In everbearing varieties almost the entire stimulus due to long daily light periods goes into fruit-bud formation. This seems to account for the few runners put out by this type of strawberry. The everbearing strawberries do not succeed under Florida winter conditions; the days are too short there for the growth of the present everbearing varieties.

The effect of temperature upon fruit-bud development is not wholly understood. Under very warm summer conditions no fruit-bud differentiation takes place in ordinary varieties. In the California districts referred to, which are near the coast, the summer temperatures are relatively low and fruit-bud formation and fruit production continue throughout the summer, whereas in the interior valleys the summer temperatures are high and little fruit is produced.

If temperature alone were considered, then moderate temperatures seem most favorable to fruit-bud formation. If the daily light period is considered alone, then light and dark periods of about equal length seem most favorable to some varieties, but a still shorter day light period for other sorts is desirable. In the case of everbearing strawberries, inherent characteristics cause fruit-bud differentiation under long days. Experiments and practice show, therefore, that both day length and temperature affect fruit-bud formation, each variety having a characteristic response to each condition. Lack of moisture also affects fruit-bud formation but indirectly, through weakening the plants, as illustrated above by the drought of 1930, and by the effect of irrigation on the Marshall in Oregon.

GEORGE F. WALDO and GEORGE M. DARROW,  
*Bureau of Plant Industry.*

**SUGAR-BEET Production** Lessened returns per ton of sugar  
**Costs Reduced by New** beets, caused by the prevailing low  
**Cross-Cultivation Method** price of sugar, make reduction of  
production costs imperative. This  
can be accomplished in part by reducing the amount of hand labor required in properly thinning and hoeing the crop. A partial mechanization of some of the hand-labor operations appears to be a logical solution of the problem, especially in view of the very recent experience in cross blocking and cross cultivating beets.

Cross cultivating beets by machinery has recently been tried on a small scale on some of the larger European estates where sugar beets form a basic part of the cropping system. To accomplish this purpose, half of the beet seed is planted in rows in one direction and the other half in the other direction. This enables the grower to cultivate his crop in the two directions of seed planting. This cross-drilling practice, however, has not given satisfactory results, owing to the fact that some of the individual beet plants are left aligned in one row and some in the cross-drilled row, thus giving such offsets as to make it

quite impossible to cultivate closely to the row because of danger of cutting out some of the beets that are not aligned. This European experience is pertinent, as it answers a question that has been of concern to many of the domestic sugar-beet growers, on the merits of cross drilling versus cross blocking. The question of space allotment per plant as required by the cross-cultivating system has also been given earnest consideration by these European growers, who find it advantageous to plant the beet seed in closer rows than the standard practice in growing sugar beets requires.

### Experience in the Humid Area

In the United States, before 1929, cross blocking and cross cultivating of beets were not attempted except in an experimental manner, and then only on a very small scale. These early experiments plainly demonstrated the workability of the practice on fields of good beet stand, although the need for such radical departure from established methods was at that time seriously questioned. As shortage of labor became acute, the industry became willing to make the concessions apparently demanded by this practice. The cross blocking differed from the mechanical blocking which has been successfully used since 1927 in fields of good beet stands as an aid to reduce competitive effects of the unthinned beet plants. In mechanical blocking the space allotment per plant is much less than in cross blocking, since no cross cultivating is attempted.

Cross cultivating of beets was undertaken on a large scale in 1930 in the Iowa, Minnesota, and North Dakota sugar-beet growing areas, by about 500 growers on approximately 10,000 acres of beets. The fields to be cross cultivated were cross blocked with the same cultivator used for later cultivation. In most cases, only fields of excellent beet stands were selected for this purpose. The cultivator, generally a 2-bar tool type, was equipped with disks for cutting the block, and shields were attached to the disks to protect the beets retained in the block from being covered by soil. Duck-feet or V-shaped knives on curved shanks were mounted on the tool bar in such a manner as to eliminate completely weeds and beets growing in the beet row between the blocks of beets which were retained. The additional cultivating tools or attachments required do not add greatly to the cost of the equipment, since they are inexpensive and usually part of the standard equipment. (Fig. 137.)

As a result of this cross blocking, thinning operations were expedited in such a manner that quite generally a twofold output of acreage thinned per day per adult worker was secured, and frequently even higher rates of thinning were reported. This higher rate of thinning is made possible because the cultivation given in two directions eliminates hand blocking and leaves the surface of the soil in such a loosened condition that the laborer can do the thinning without using a hoe. This greater efficiency of hand labor, and the handling of a considerable part of the job of blocking and thinning with local labor, is of great significance as a means of reducing cost of production of sugar beets.

### Weeds More Effectively Controlled

After being thinned, the cross-blocked beets were cross cultivated in the same way that a cornfield is handled. As a result of this cross cul-

tivation weeds were controlled more effectively than in fields where cultivation in only one direction was given. On the acreage thus cross cultivated, the subsequent hoeing cost was about \$2.50 per acre, as compared with the contract hoeing price of \$6 where no cross cultivation was employed.

Since, in the cross-cultivating operations, a different spacing of beets in the row and different distances between the rows are necessary, both being departures from the established practice, a spacing test was conducted at South East Experiment Station at Waseca, Minn., in 1930, to determine the proper space allotment per individual beet plant. This test, which was adequately replicated, indicated that the beet plots in which beets were spaced 18 by 18 inches apart produced very satisfactory yields in comparison with the standard 22 by 12 inch spacing of beets for the southeastern Minnesota area.

The question of how far apart the rows should be planted and the distance of spacing beets in the row must necessarily be answered by the available soil moisture supply, whether or not irrigation of the crop is practiced, the soil

type and slope, the fertility of the soil, and the equipment available for this work. Where a tractor is available for cross blocking and cross cultivating the rows can be considerably narrower—16 by 16 inches and possibly less—than where heavy draft animals are used for this work.



FIGURE 137—Cross blocking and cross cultivation of sugar beets. A—Note the arrangement of tools, consisting of disks, shield, and duck feet, and the marker attachment. B—The same field thinned. Note the square pattern 18 inches by 18 inches, the full stand, the clean condition of the field, and the sturdy growth of the beet plants. C—The same field at harvest. Note the uniformity of foliage growth and the excellent condition of the field in spite of a protracted period of drought.

Cross cultivation of beets seems a logical step in the mechanization of the sugar-beet industry. With proper control, it should develop into a widespread practice. Success with this method, however, requires greater attention to fundamentally sound agricultural practices such as proper fertilization, a good cropping system, fall plowing, early and thorough seed-bed preparation, and a first-class stand of beets. To secure a good stand suitable for cross cultivating, a generous seeding rate, timely seeding in narrower rows, and early cultivation are necessary. The small blocks (2 to 3 inches wide) which are left should be promptly thinned under close supervision, so that all weeds are removed and the strong, sturdy beet plant is retained. To obtain the maximum benefits from weed control, and to produce an effective soil mulch, cultivation of the crop in both directions should be continued as long as necessary. Where due attention is given to these items, a material saving in both ton and acre costs of production of sugar beets should result.

A. W. SKUDERNA, *Bureau of Plant Industry.*

## **SUGAR-BEET Production Is Entering New Era As Disease Control Gains**

In common with other agricultural crops, the sugar beet is subject to serious losses because of plant diseases. These losses vary somewhat from year to year, but they are annually, in one area or another, a serious handicap to successful and stable crop production. Specific control of sugar-beet diseases has usually not been attempted. Certain general measures, which may collectively be termed good farming practices, have served in the past to minimize losses. With the pressing economic requirement for efficient crop production, more attention is being given to disease-control methods as means of increasing production per unit area by preventing losses and wastes caused by diseases. A few illustrative examples are cited from work of the scientific staff of the Division of Sugar Plant Investigations now in progress.

The blackroot disease of the seedling beet is the most frequent cause of bare, idle spots in the sugar-beet field, and is chiefly responsible for the poor stands obtained in certain eastern areas. Because of attack by parasitic fungi, the young plant may never get above the ground, or if it emerges may "damp off." The fungi that cause this disease are in part seed-borne and in part present in the soil. In combating the blackroot disease, crop rotation, the use of well-drained fields, good seed-bed preparation, seasonably early planting, and prompt cultivation have been found helpful. It is a common observation that the beet plants in the field before thinning show marked differences among themselves; some are stunted and apparently unable to grow, others are sturdy, vigorous plants whose leaves and roots are already rapidly expanding. The healthy plant stands out strongly from its diseased neighbors. The selection of such sturdy plants at thinning time has been shown to give marked improvement in stand, and the effect of this selection has been reflected in the yields. Care at thinning time to insure starting with healthy plants also does much to avoid the rotting of half-grown or mature beets in the field, since much of this rotting seems to trace back to disease contracted in the seedling stage.

### Disinfection of Seed Balls

A new method to supplement these desirable practices seeks to protect the young plant from the invading fungi by coating the seed with a fungicidal dust which disinfects the seed ball and a small zone of soil around the young plant. One of the most successful dust coatings yet found contains a mercury compound as the fungicide and in addition has a small amount of readily available plant food which promotes rapid growth of the young seedling. In the experimental trials, seed-treatment methods have been highly successful in preventing the blackroot disease. Field experiments to adapt seed treatment for commercial use are under way. The field problem is complicated by the massiveness of the infection that sometimes occurs with heavy, poorly drained soils, the different species of fungi involved, and the great variety of conditions encountered in the field tests. The results so far indicate that a simple and fairly inexpensive seed treatment gives excellent stands under conditions where untreated seed gives unprofitable ones.

The sugar-beet nematode has caused serious injury to beets in western beet-growing areas, and the infested acreage is becoming larger each year, because of failure to maintain a safe rotation and owing to the introduction of infested soil into clean fields. Tests over a number of years have shown that for almost all western areas a long-time rotation system, using crops, such as alfalfa, not subject to injury by this nematode, is adequate to control the nematode. In the California area this method apparently has not been successful. It has been shown that the presence of various susceptible weeds served to prevent the nematode from being starved out. Improvement of the alfalfa stands by better methods of culture, by application of commercial fertilizer, primarily phosphate, where necessary, and by plowing up the alfalfa as soon as weediness begins to develop, has made nematode control by crop rotation successful in California.

The leaf-spot disease caused very great damage in 1930. In experiments in Colorado, where the disease was at its worst, the leaf spot was controlled by dusting the fields with a fungicidal dust, composed of 20 per cent copper sulphate (dehydrated) and 80 per cent lime (hydrated), applied four or five times at 10-day intervals, beginning about July 1. The total cost of the treatment, about \$5 an acre, was greatly exceeded by the gains obtained through leaf-spot control. In many large-scale tests increases of  $1\frac{1}{2}$  to 2 tons per acre in yield and from 750 to 1,000 pounds of sugar (estimated, net) resulted from the dusting. Commercial use of the method on about 500 acres was similarly successful.

### Disease-Resistant Strains

Leaf-spot-resistant and curly-top-resistant strains of sugar beets have now been produced as a result of years of intensive pathological and breeding work by the Department of Agriculture. By selecting individuals that were outstanding under conditions of severe disease outbreak, and by repeated elimination tests, strains of beets that are highly resistant, of high quality, and of high yielding capacity have now been obtained. In the 1930 tests the leaf-spot-resistant selections produced approximately 2 tons more beets per acre, containing  $1\frac{1}{2}$  to 2 per cent more sugar, than the commercial checks. The curly-top-resistant strains under moderately severe curly-top conditions out-yielded the commercial checks 3 to 1, and except for the most severe

curly-top conditions apparently give satisfactory yields. Breeding work to improve these resistant strains further is being continued, and as rapid an increase of the present seed stocks as practicable is being made to permit introduction of these improved strains into commercial use.

Disease-resistant strains represent the ultimate solution of the serious disease problems in sugar-beet growing. Since all the sugar-beet seed used is under the direct control of the contracting companies, the resistant strains, as soon as they become available in adequate quantity, can readily be substituted for the nonresistant strains. Such a control measure, which entails little if any extra cost, will largely free the farmer from the disease hazard which now is so serious in many areas, and will also bring about the return of sugar-beet production in many areas where beet culture has been abandoned because of diseases.

Sugar-beet growing can be said to be entering a new era in which safe and effective methods for increased crop production and for the prevention of disease losses will be employed to a far greater extent than has been done previously. The sugar beet responds readily to proper cultural practices, and the improved methods of crop handling will bring about efficiency and economy in production. In addition, specific control measures, such as seed treatment, dusting to prevent leaf diseases, the scientific use of rotation as a sanitation measure, and other methods which are under development, will greatly reduce the present crop losses. In this phase the disease-resistant strains are especially important. The finding that strains of sugar beets which are resistant to disease can be developed by methods of selection and breeding is significant not alone because of the relationship to the particular diseases that have been under study but because of the wide adaptability of the finding to other and similar sugar-beet problems.

G. H. COONS, *Bureau of Plant Industry.*

## **S**WINE Take Lungworms into Their Bodies by Consuming Earthworms

Lungworms, of which three different kinds are known to occur in swine, are among the most injurious parasites which infest these animals. The

young forms of various other parasites of swine remain in the lungs for varying periods and then pass out of these organs, but lungworms localize in the lungs and remain there throughout their life. The degree of injury inflicted by lungworms depends to a large extent upon the number of worms which lodge in the lungs as well as upon the degree of resistance the animals offer to the invasion of the parasites. Young pigs have comparatively little resistance to parasites in general, and a heavy lungworm invasion of such vital organs as the lungs is likely to produce serious consequences.

The most outstanding symptom of lungworm infestation is a husky cough, a condition which weakens an animal, particularly a young animal, and lowers its vitality. Though lungworms occur in the windpipe and in its two main branches, the bronchi, they usually accumulate in the finer branches of the bronchi, known as the bronchioles. They are commonly present in sufficient numbers to plug completely the finer bronchioles in which they lodge, thereby interfering with normal breathing. The accumulation of the worms in these locations is commonly accompanied by more or less localized pneumonia.

### A Knowledge of Life History Important

In order to combat a parasite it is important to know the essential facts of its life history, particularly the way in which it gains entrance to its host. Without this knowledge comparatively little can be accomplished in the way of rational control and prevention. Until very recently nothing was known regarding the manner in which lungworms entered the bodies of swine and of their subsequent development in the hosts. In view of this no recommendations of control and preventive measures could be made with any assurance of success.

Investigations carried out in the Zoological Division of the Bureau of Animal Industry a number of years ago demonstrated conclusively that the larvæ of swine lungworms, which hatch from eggs that are discharged by these parasites, are not capable of infecting swine. The results of these investigations pointed to the likelihood of an intermediate host in which the parasites would have to undergo part of their development before being capable of establishing themselves in swine. However, the kind of intermediate host involved in the life history of swine lungworms was not determined in the course of these investigations.

### Earthworms Found to Transmit Lungworms

In 1929 two German scientists discovered that common earthworms, or angleworms, were the intermediate hosts of swine lungworms, and demonstrated that swine could be experimentally infected by feeding them infested earthworms. These investigations were promptly confirmed by the writer and J. E. Alicata, junior zoologist, of this bureau, who traced the complete life history of the parasites from the time they entered the bodies of earthworms until they attained their full development in swine. Briefly, the life history is as follows:

Swine infested with lungworms eliminate the eggs of these parasites with the manure. Earthworms which are present in hog lots and pastures take the manure into their bodies and with it the larval lungworms which hatch from the eggs. Once inside the body of earthworms, the lungworm larvæ enter the wall of the esophagus, and in this and other locations to which they wander the larvæ grow and develop to a stage which is infective to swine. In warm weather the period required for the development of lungworm larvæ in earthworms is about 10 days but in cooler weather this period is prolonged considerably. It has been determined that lungworm larvæ may remain alive in earthworms for several months. If infested earthworms are eaten by pigs, the lungworm larvæ are set free in the intestine as a result of digestion. The larvæ then penetrate the wall of the pig's intestine and on reaching the lymph spaces they are carried along with the lymph stream and thus get into the blood. They finally localize in the lungs and attain fertile maturity in about four weeks.

### Earthworms Abundant in Old Hog Lots and Permanent Pastures

Investigations carried out on farms in Maryland, North Carolina, and Georgia have shown that earthworms are particularly abundant in

old hog lots and on permanent pastures. The accumulation of manure and litter in permanent hog lots is especially favorable to the perpetuation of earthworms which thrive and multiply in such places, presumably because of the abundant food supply which they obtain from the manure. Well-drained, cultivated fields, on the other hand, have been found to contain relatively few earthworms. In some fields which had been cultivated seasonally, very few earthworms were found after a rather prolonged search.

In the light of these findings, it is evident that lungworm infestation in swine is likely to be present and troublesome when these animals are raised in hog lots and on permanent pastures. This was actually found to be the case in investigations conducted in the States mentioned. A large percentage of earthworms, obtained from old hog lots and from permanent pastures on which hogs had been raised year in and year out, were found to be infested with lungworm larvæ. In some cases 1,000 or more larvæ were found in a single earthworm.

In view of the rooting habits of swine, it is easy to see how they would become heavily infested with lungworms should they happen to swallow, as they are likely to do, only two or three heavily infested earthworms. As already stated, earthworms were obtained in only very small numbers from hog lots and pastures which had been cultivated seasonally, and in these cases the degree of infestation of the earthworms with lungworm larvæ was usually slight, or infestation was altogether absent. Low areas outside the fences of these cultivated fields usually harbored a fair supply of earthworms more or less heavily infested.

#### Keep Pigs Confined in Clean Fields

It is evident from these findings that control of lungworm infestation in pigs necessitates raising the animals on new pastures or cultivated fields, and preferably on fields which are well drained. In this connection it is important to have good fences in order to keep the animals from getting outside the fields. Pigs should not be raised on old hog lots and permanent pastures, as these places harbor not only earthworms, the source of lungworm infestation, but also eggs and larvæ of various other swine parasites and the germs of infectious diseases.

BENJAMIN SCHWARTZ, *Bureau of Animal Industry.*

**T**ENDERNESS Tester for Canned Goods Aids in Food Law Enforcement

The McNary-Mapes amendment to the food and drugs act, signed July 8, 1930, charges the Department of Agriculture with the responsibility for fixing standards of quality and condition for certain canned foods. The amendment requires a special form of low-quality branding on all products falling below the announced standards. Faced with the necessity of measuring the various quality factors in some accurate and objective manner, the department's scientists were forced to invent an apparatus for measuring tenderness, a major factor in the quality of many canned foods.

After exhaustive experiments, a device<sup>3</sup> was perfected that is sufficiently versatile to measure with precision the tenderness of such

This apparatus is described and illustrated in Department Circular No. 164, An Apparatus for Determining the Tenderness in Certain Canned Fruits and Vegetables.

widely different canned foods as peas, peaches, apricots, and pears. In every case, department findings have tallied with the consensus of expert graders as to the point at which lack of tenderness becomes definitely objectionable.

The advantages of an impersonal method of tenderness measurement, independent of personal judgment, capable of and giving accurate results in the hands of any intelligent operator, are obvious. The canner can assure himself, by his own tests, that his product conforms to the tenderness requirement. On standardized products, like peas for example, where tenderness is a paramount quality factor, the consumer is warned against hard and tough canned food by the low-quality legend required by law. Last, and most important of all, the farmer now seems to have some hope of getting, in the future, a satisfactory reward for producing fruits and vegetables of the proper stage of maturity for canning. There seems to be no reason why the apparatus should not prove equally satisfactory for measuring the tenderness of many raw food products of various sorts, and of other canned foods not yet under standardization. The device is illustrated in Figure 138.

As used on fruits, the device is very simple, consisting essentially of a vertical metal plunger sliding freely in a close-fitting sleeve. On its lower end is a cylindrical rod of specified diameter, which is made to penetrate the fruit by means of a load of mercury applied at the upper end of the plunger. Penetration is abrupt and complete, and the weight of plunger, flask, and mercury at the moment of penetration constitutes a precise measure of the tenderness of the fruit under test.

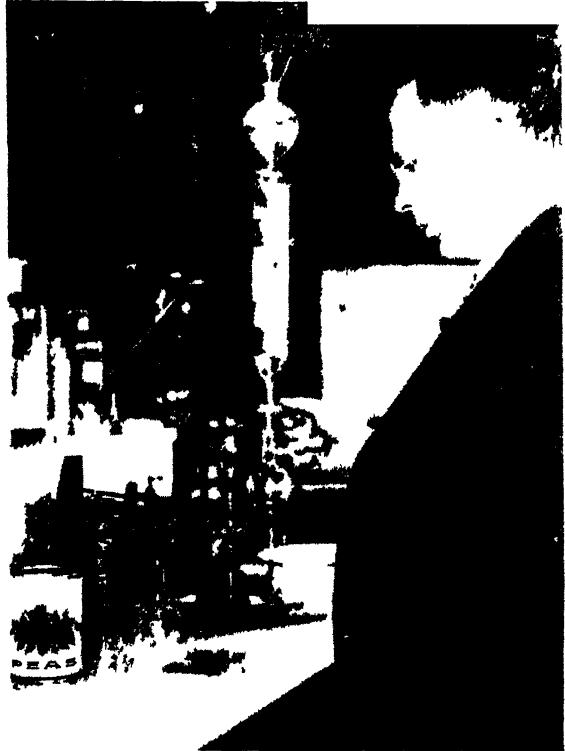


FIGURE 138—V. B. Bonney using apparatus designed by him and other chemists to test the tenderness of canned peas

#### Resistance to Crushing Measured

With a canned food, such as peas, the device becomes more complicated. Crushing is a better measure of tenderness here than penetration, and the rod is accordingly replaced by a horizontal metal disk.

The end-point is not definite as in the penetration test for fruits, and thus it is necessary to crush the pea to some predetermined fraction of its original thickness. This necessitates a micrometric method of measuring the diameter. This is effectively accomplished by a long lever so pivoted as greatly to magnify the measurements, which are then read off on a graduated scale. Scale and lever are so insulated that a buzzer will sound when the disk is depressed to any predetermined distance from the "zero point," which is, of course, the point where the disk is in contact with the surface which supports the material under test. The adjustment is such that, in this position, the lever reads zero on a graduated scale. If, now, a pea is found to measure 28 on the arbitrary scale, one can set the lever at 7 and be assured that the buzzer will sound when the pea has been crushed to exactly one-fourth its original diameter by the load of mercury. Mercury, flask, and plunger are then weighed as in testing fruit.

W. B. WHITE, *Food and Drug Administration.*

## TIME-LAPSE Motion-Picture Camera Helps Department's Research<sup>4</sup>

For several years the Department of Agriculture has possessed a so-called time-lapse motion-picture camera, designed for making accelerated-action cinematographs. This equipment, consisting of an ordinary motion-picture camera, with clock movement, motor, and associated automatic switches, enables the cinematographer to make exposures at intervals ranging from a fraction of a second to one hour, thus making film that, with normal projection, presents action accelerated in proportion to the length of time between exposures.<sup>5</sup>

Time-lapse shots have been made with this device from time to time for use in departmental motion pictures, but it was not until 1928 that the experimenters began to realize the possibilities of time-lapse cinematography in research. At that time, while they were running time-lapse shots of germination tests for the seed-testing laboratory of the Bureau of Plant Industry, something developed that gave them a new conception of the time-lapse camera as an instrument for research.

The work had been planned to show the progress of a germination test as a minor feature of a general film on seed testing, but the behavior of certain seedlings, that germinated but failed to grow, proved so unexpected and interesting that an entirely new set of tests was started solely for the purpose of observing the peculiarities of these abnormal seedlings. The time-lapse camera was run for many weeks on these tests and the result was so enlightening to those who conducted the experiment that they took the film to Rome on the occasion of the fifth congress of the International Seed Testing Association and showed it before that body. Edgar Brown, in charge of the seed-testing laboratory, relates that it was necessary to run the film many times in succession in order that the audience might have an opportunity to observe carefully the action of the abnormal seedlings in question.

<sup>4</sup>This article summarizes the material presented in an article by the same writer in the *Journal of the Society of Motion Picture Engineers*, Vol. XVI, No. 5.

<sup>5</sup>This mechanism, originally designed by George R. Goergens about 10 years ago, was built and perfected by the late Howard Greene.

### Used in Studying Bacteria

During the winter of 1929-30 the research laboratories of the Bureau of Dairy Industry used the time-lapse camera in studying the growth of bacterial cultures. For this purpose a Pyrex glass tube 7 millimeters in diameter and 30 meters long, coiled in a flat spiral and filled with an infusion broth, was used as a track along which the progression of the bacterial growth was to be photographed. The culture was started at the center of the coil, and as it worked outward through the coil its progress was marked by a decided change in color of the liquid in the tube. The coil was so mounted as to fill the field of the camera. The room in which the work was done was held at an even temperature by automatic controls and exposures were made at 5-minute intervals. A watch, placed in one corner of the field, provided a check on the timing mechanism of the camera. About eight days were required for the culture to traverse the 30-meter length of the coil, and during that time about 140 feet of film was exposed.

This film was then projected with a film-strip projector to the full size of the coil itself, and working on this projected picture, one frame at a time, a series of measurements was made and tabulated. These measurements, disclosing the progress of the culture in millimeters per hour, were plotted against the total hours of growth, and the resultant graph indicated beyond question the fact that the growth of the bacteria was intermittent and that the recurring periods of growth and rest were fairly rhythmical. These facts were of profound interest to the investigators who conducted the experiment. The paper on the subject, by L. A. Rogers and G. R. Greenbank, published in the *Journal of Bacteriology*, aroused keen interest among bacteriologists in general, since the time-lapse cinematographs in question served to establish facts that had been suggested by the growth of cultures on agar plates, but which could not positively be proved by that method. As to the ultimate scientific significance of this fact, one can only conjecture; it may or may not have a bearing on intermittent fevers. In any event it provides further evidence of the value of time-lapse cinematography in research.

### Not Used as a Motion Picture

It should be noted that neither in the case of the germination test, nor in that of the culture test was the resultant film used as a motion picture in the sense in which we are accustomed to think of motion pictures. In the first instance the film was projected over and over, to enable the observers to make careful note of minute movements of the roots and stems of the seedlings; in the second instance the film was not used on a motion picture projector at all but on a slide projector.

In this connection, then, the time-lapse camera should be considered as an instrument in the same category as the microscope; it makes visible to the eye action that is normally invisible, as the microscope makes visible to the eye objects that are normally invisible. The microscope exaggerates space; the time-lapse camera epitomizes time with reference to movement, and shows motions and rhythms which are hidden by the normal lapse of the hours.

RAYMOND EVANS, *Extension Service.*

**TOBACCO Culture Needs Improvement in Methods of Growing and Curing** A number of distinctive types of tobacco are produced, each of which is grown in certain areas possessing the proper conditions of climate and soil. Generally speaking, it is a waste of time and money to try to change the type produced in a given locality. It is useless, for example, to attempt to grow cigarette tobacco in cigar-filler tobacco territory, or to grow bright flue-cured leaf in regions adapted to the production of dark, heavy air-cured or fire-cured tobaccos. As a rule only local varieties of seed should be used. Moreover, far too many local varieties and strains are in use. Promising results have been obtained in developing standard local strains possessing ample yielding capacity and desirable habits of growth, including necessary resistance to diseases, and at the same time capable of producing a quality of product generally acceptable to the manufacturer. General use of standard strains would go far toward insuring for each distinctive type a product of greater uniformity and higher quality.

### Soil Management and the Cropping System

To obtain high-quality tobacco of a given type it is not only necessary to choose the right type of soil but it is also important to maintain the right conditions in the soil. Recent investigation has emphasized the special need of giving close attention to two of these conditions, namely, soil reaction and soil aeration. In general the tobacco plant grows best in a moderately acid soil, one having a pH value ranging from about 5 to 6. If the soil is too acid, among other things manganese or other heavy metals are likely to become sufficiently soluble to produce toxic effects on the plant. In a neutral or alkaline soil there is danger of serious damage from the black root rot disease. On some of the light sandy and sandy loam soils tobacco has been grown continuously for more than a half century without decline in yield or quality. Suitable systems of crop rotation may be needed to maintain other soil types in proper condition. However, on some soils tobacco is very sensitive to the effects of preceding crops in the rotation. On such soils tobacco may be a failure when grown after a timothy sod or after such crops as clover or corn. In this case continuous tobacco culture may give best results. The wild vegetation resulting from allowing the land to remain idle for two or three years often greatly improves the yield and especially the quality of the tobacco crop. It has been found that the tobacco plant also is very sensitive to inadequate aeration of the soil. In this connection thorough and frequent stirring of the soil is helpful, and oftentimes moderately high ridging of the rows, particularly in the later stages of cultivation, gives excellent results.

### Fertilizer Usage

An abundance of plant food with a high proportion of nitrogen in the ration is needed for best results with cigar tobaccos. Cigarette tobaccos, especially the flue-cured type, should be grown with a comparatively low supply of nitrogen. For the cigar types grown without manure the proportions of nitrogen and potash should be about the same and equal to or somewhat greater than the proportion of phosphoric acid. When manure is used larger proportions of phosphoric acid and

potash are desirable. For cigarette types the nitrogen supply usually should be not more than one-half that of the phosphoric acid, while the potash supply should equal or exceed that of phosphoric acid. For the cigarette types, therefore, larger quantities of potash than have been formerly used are indicated. It appears that somewhat larger proportions of inorganic or organic water-soluble forms of nitrogen than have been supposed to be safe can advantageously be used in place of cottonseed meal and other similar organics in the case of cigarette tobacco, where the fertilizer is applied in the row. Present indications are that these increases in water-soluble materials in the fertilizer, together with a tendency toward heavier rates of fertilizing, will make it necessary to resort to fractional or split applications on light soils. This problem is now under study.

### Control of Diseases

In most instances prevention rather than cure is the key to effective control of diseases. Some of the most important diseases usually originate in the seed bed, and production of disease-free seedlings should be one of the principal aims of the grower. Effective seed-bed sanitation should include use of disease-free seed; employment of soil, frame, and covers for the seed bed known to be free from contamination or made so by steaming or other satisfactory method of sterilizing; application of all necessary measures to prevent infectious tobacco material from reaching the beds; avoiding careless use of tobacco in smoking or chewing when working about the beds. These precautionary measures apply particularly to wild fire and similar leaf-spot diseases and to mosaic. For black root rot and black shank the use of highly resistant varieties offers the best method of control. For root knot and Granville wilt, crop rotation is the only method of control now available. Rotation also is an important step in preventing the development of mosaic in the field.

### Curing

Air curing, pure and simple, gives satisfactory results only when the weather conditions are reasonably favorable. In periods of excessively wet weather, losses from pole sweat or house burn are to be expected unless some form of artificial heat is used to reduce the humidity. There is great need of a cheap, effective method of introducing into the barn, air that has been previously conditioned. In the meantime more general use should be made of charcoal fires on the floor of the barn as a means of preventing pole sweat. In flue curing an important forward step has been made in the introduction of fireproof barns constructed of clay or concrete tile. The dwindling supply of wood for fuel is creating a need for more economical methods of obtaining the necessary heat for flue curing. Similarly, for fire curing it is becoming increasingly difficult to obtain an adequate supply of suitable hardwoods for fuel, and research is needed in the use of wood distillates or other substitutes for imparting the necessary flavor in the smoke curing. Scarcity of fuel often leads to insufficient firing or smoking during the curing.

W. W. GARNER, *Bureau of Plant Industry.*

**T**OBACCO Grading and Market News Promote Fairer Auction System      The auction system of marketing tobacco through which approximately 82 per cent of American tobacco is sold is the only large-scale system

of marketing through which lots of identical quality sell at widely different prices, on the same market, on the same day, under the same conditions, and to the same set of buyers. A lot of tobacco may be auctioned at a certain price and almost immediately thereafter be resold for double or half the amount first offered. The wide spread in prices paid for lots of the same grade of tobacco on auction floors is due to several factors. One of the principal factors is the system of buying on the basis of average prices for private grades. Each buyer will purchase tobacco according to several private grades. The buyer is not concerned with the price of individual lots but buys to make any grade average a certain price for the day's purchase. If a buyer has an average of \$20 per 100 pounds on a particular grade and secures certain lots of that quality at \$10, he can buy in other lots of the same quality at \$30 and keep his average within stipulated limits. This undesirable feature of the auction system makes it impossible for farmers to determine the market value of any tobacco they may have for sale. In addition, each buyer indicates the quality of his purchases by private grade marks and this further confuses farmers since they are unable to interpret correctly the grade symbols of all buyers.

It is evident, therefore, that farmers require information on two separate, but closely related, phases of tobacco marketing. They should know the grade of each lot and the average market price being paid for each grade. The first has been provided by the United States standard grades for tobacco and their application through the Federal-State tobacco-grading service. The second can be supplied only by furnishing farmers prices at which standard grades are actually sold. This is done through the market-news service on tobacco.

Three distinct classes of tobacco are marketed by the auction system. These are known as flue cured, fire cured, and air cured, and in appearance and use are as distinct as three kinds of fruits or vegetables. These classes are subdivided into types. Each tobacco market is usually organized for the sale of a particular type, and for this reason, market-news information from markets of one type is of no great value to farmers who produce tobacco of another type.

### Necessary Bases of the Service

Market-news service on tobacco, to be of benefit to farmers and the trade in general, must be based upon sales of individual types of tobacco and average prices for the grades of a particular type must be determined by actually grading a large volume and calculating the average price for each grade. The tobacco market-news service of the department is based upon all information that can be obtained and compiled for a type area. Only one tobacco market-news office is established for a type, since the variation in price per grade on any market is almost as great as that between markets and also because the expense of operating a tobacco market-news service would be needlessly increased by reporting each market separately. In some cases it has been possible to secure sufficient price information from one important market of the type, whereas for other types it has been practicable to

secure information from several markets and correlate it at one news office that issues reports for the type.

Three kinds of reports are issued: Press reports, daily mimeographed reports, and weekly mimeographed reports. Press reports are released by telegraph to the press on the afternoon of each marketing day. These reports give average prices paid, on the day of dispatch, for certain "key" grades; information as to the volume of sales for the market, or markets; and range in quality of the tobacco offered for sale. Daily tobacco market-news reports are mimeographed, at the local market-news office, on each marketing day. These are distributed to farmers on auction floors and by mail. They are also sent to the agricultural press, agricultural teachers, county agents, warehousemen, tobacco companies, and other persons interested in the tobacco industry, who request that their names be placed on the mailing list. In daily reports, average prices, by grades, are given for the day as compared with averages for the previous day, for the previous week, and for the season to the end of the previous week. Information relating to individual markets and general price comments are also included in daily reports. State officials have cooperated by broadcasting over the radio information contained in either daily or press reports. Weekly reports are issued on Saturday from tobacco market-news offices for each type. The weekly reports give average prices per grade for the week, for the season to date and for the previous season. These reports also review the market conditions for the week and give information on crop conditions, on stocks on hand by types, and on domestic and foreign conditions affecting the tobacco industry.

Farmers can, by consulting the reports of the tobacco market-news service, keep thoroughly posted on current tobacco prices, by grades. Immediately following an auction sale, farmers have the privilege of rejecting the prices offered for any lots of tobacco, but heretofore they have had no definite information which could be used as a guide in accepting or rejecting bids offered. The application of standard grades and the market-news service on tobacco provide the means for a more uniform and equitable system for marketing tobacco on auction floors.

FRANK B. WILKINSON, *Bureau of Agricultural Economics.*

## **T**OMATO Variety Called Break o' Day Succeeds in Far Scattered Tests

A new variety of early tomato called Break o' Day is the outstanding result of a cross of Marglobe on Marvona made in the greenhouses of the United States Department of Agriculture at Washington, D. C., in 1923 by the late Fred J. Pritchard, formerly senior physiologist in the Division of Horticultural Crops and Diseases of the Bureau of Plant Industry. The new tomato is rapidly gaining favor as a marketing and shipping variety because of its earliness and the large proportion of fancy fruits that it produces over a relatively long bearing season. It has been tested in commercial plantings in practically all of the tomato-growing areas east of the Mississippi River from Maine to Florida, with a few scattered plantings reported westward to the Pacific coast. Although the results reported from these widely scattered tests have in most instances been remarkably successful, there

have been a few unfavorable reports, which are not surprising when any variety is tested over such a wide range of climatic, soil, and cultural conditions. The distinctive characters that would give the variety outstanding merit in one environment might cause it to be considered inferior under another set of conditions. The Break o' Day has already been enthusiastically received in a large number of tomato-growing centers in which it has demonstrated its superior worth.

#### Produces Good Quality Fruit Early

The Break o' Day combines the earliness of the Marvana parent with the approximate fruit size, shape, and quality of the Marglobe



FIGURE 139.—Fruit of Break o' Day tomato

parent. It is at least 10 days earlier on the average than Marglobe, and although it produces fewer early fruits than either Marvana or Earliana, it produces nearly as much early fruit by weight, and the fruit is superior to that of the other early varieties in size, solidity, color, and flavor. (Fig. 139.) The vines of the Break o' Day are small leaved and of an open, sprawling type which makes practically all the fruits visible to the picker without moving the foliage of the plant aside. In this respect Break o' Day is very similar to the Marvana parent, which has the Earliana vine type, although the Break o' Day vines are larger

Heavier foliage would no doubt give more protection to the fruit during very hot weather. However, sparse small-leaved foliage seems to be associated with early flowering and early setting of fruit, and since an early set of fruit is such an important factor in an early variety, the shortcomings of the scanty foliage are probably outweighed by its advantages.

### Resists Diseases and has Long Bearing Season

Break o' Day is resistant to Fusarium wilt of vines and to nailhead rust of fruits. It is also slightly resistant to blight, especially Septoria leaf spot and early blight. In many field tests the Break o' Day and Marglobe were practically free from blossom-end rot when other varieties growing beside them were badly affected by it, and the fruits were not so susceptible to cracking as were those of most of the other varieties. It also withstood the prolonged hot dry weather of 1930 better than other varieties.

In yield, Break o' Day is superior to Earliana, for it not only produces approximately as much early fruit but on fertile soils usually continues to bear until killed by frost. Yields of 15 tons per acre were reported by several growers in the dry year 1930. Furthermore, the vines, which are well supported by an extensive root system, produce a large proportion of fruit of fancy sizes throughout the picking season, because of the habit of setting a uniform succession of fruits.

### Well-Ripened Fruits are Bright Scarlet

On the department's test plots where the Break o' Day lines were grown while the variety was being developed, the fruits ripened very evenly, passing successively during the ripening process from a yellow green to yellow red, finally becoming bright scarlet on the outside, with scarlet red internal color. However, during the intense drought and heat of 1930, and the heat of 1931, some of the fruits failed to develop a good color, especially at the stem end, and some scalded. This difficulty, however, was no more serious in Break o' Day than in other early varieties. The failure to develop a satisfactory color in the cases cited was probably due to the high temperatures, ranging from 90° to 108° F., which prevailed during the ripening period. The development of the red pigment of the tomato fruit is inhibited at temperatures above 86°.

The immature fruits are a light shade of green throughout their development until they enter the ripening stages. In tomato-growing areas where the tomatoes are picked and packed in the mature-green stage, this may sometimes cause premature picking, as the fruits of most varieties pass from a darker to a lighter green shade as they approach maturity, and this change of color is used as a picking indicator. The mature-green stage of any tomato variety can readily be determined, however, by cutting the fruit transversely with a sharp knife. When the seeds are pushed aside without being cut, the fruits are mature green. The color changes in Break o' Day fruits should be checked with this test until the picker is able to detect maturity from outward appearances, because tomato fruits picked before they reach the mature-green stage do not ripen well and therefore are of very inferior quality and flavor.

### Favorably Received by Growers and Shippers in Many States

Although the merits and limitations of a new variety can not be definitely determined until after it has been widely grown for a number of years, the results obtained thus far with Break o' Day indicate that it will occupy a position of considerable importance among early varieties of tomatoes.

The Department of Agriculture has placed Break o' Day seed with commercial seed growers to enable them to produce a seed crop for the seed trade. It has also placed seed samples with seedsmen for use in their trial grounds. Therefore an ample supply of seed should be available for the crop season of 1932.

WILLIAM S. PORTE, *Bureau of Plant Industry.*

**T**RAIL Builder Developed For Use in Constructing National Forest Roads The largest single job confronting the Forest Service in the Northwest is protecting the national forests from fire. Successful suppression of fires requires getting men, equipment, and supplies to the fire in a short time. While some fires occur within striking distance



FIGURE 140—The "trail builder" at work on the St. Joe River forest-road job, Idaho

of roads and trails, lightning, one of the worst foes of western woods, often starts fires in inaccessible places. To reach these fires before they spread is the problem. Every minute counts, and more roads and trails are a vital necessity.

To complete the protective and administrative road system within the national forests some 31,000 miles of road must be built or brought

up to a higher standard. This involves the expenditure of some \$60,000,000, and no small amount could be saved if machinery were devised to handle material at costs comparable to those for highway construction. (Fig. 140.)

Construction for public travel of low-standard pioneer roads with a width of from 10 to 12 feet is declining. Modern trucks and automobiles have supplanted old types of transportation. Present travel on highways demands a greater width than that of the pioneer road built to accommodate 2-way traffic.

Decline in low-standard roads has made manufacturers reluctant to invest funds in experimentation on machines for building them. Profits are much greater from producing machinery for handling the relatively large volume of material used in building the modern highway. Therefore, forest engineers had to undertake to solve their own problems.

## Necessity for Special Machinery

Use of ordinary highway-excavation machinery requires a roadbed much wider than the road necessary for forest use, and the cost of this wider roadbed, even when built with machinery, is more than the cost of a narrow road built largely by hand. This was the situation confronting Forest Service engineers when they sought machinery to build forest-development roads.

Formerly it was necessary to build by hand labor a trail not less than 6 feet wide to accommodate the small tractors and graders which built the balance of the road. This preliminary hand-built trail cost more than completing the road. Elimination of this handwork was a big part of the problem.

There was on the market a so-called "back filler," a large blade installed in front of a tractor and used for pushing dirt back into excavated trenches. With this machine as a base, experiments were car-

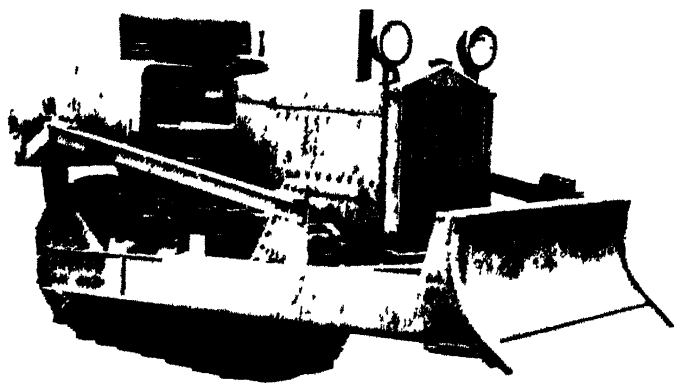


FIGURE 141.—The trail builder

ried on with various blades to determine which one would give the best cutting capacity, with a proper angle and a suitable lifting mechanism, the whole to be attached to a tractor of the proper size. (Fig. 141.)

Earlier experiments were made with small-sized tractors, but experience indicates that medium-sized tractors are best adapted for the work. The new machine is called a "trail builder," as it is used to build the original trail to a width of 8 or 9 feet, which is sufficient to accommodate tractors and graders which complete the road. The trail builder also grubs out small trees and brush. Its use has reduced the cost of forest-road construction almost 50 per cent.

The trail builder, as now developed for work in Montana and northern Idaho, was built by a Pacific-coast firm in conformity with plans and specifications submitted by the Forest Service, and is an attempt to correct weaknesses in previous models. Undoubtedly further progress will be made in perfecting the machine.

FRED E. THIEME, *Forest Service.*

**TRENCH Silos, Provided With Drainage, Are a Success in Humid Areas** A trench silo is merely a large trench dug in the ground with the ends on an incline so that a team or tractor can be driven through and practically all the work of construction done by power. The walls are finished smooth and nearly perpendicular with a spade. The width, length, and depth are varied according to the location or to the number of cattle to be fed. The idea of the trench silo is not new, since this type is merely a modified form of the pit silo. The construction of a trench silo, however, has the advantage of allowing all the excavating to be done without hoisting and does away with the necessity of materials for walls and of skilled labor for construction. These economies practically put a silo within the reach of any man who has time to dig one.

In parts of the West where there is little rainfall, trench silos have been used for a number of years, but they have found little favor in the East, where the winter rainfall is heavy. What is believed to be the first trench silo east of the Mississippi River was dug at the McNeill Experiment Station, McNeill, Miss., in 1926, after three stave silos had been blown down by winds of gale force. A pit 8 feet deep, dug several years before, led the writer to believe that there would be no trouble from caving walls and no serious danger of seepage, but there was doubt regarding the success of a trench silo in a region where the rainfall averages above 60 inches annually and is heavy in winter. However, a trial was considered worth while.

#### Need for Drainage Is Evident

The first trench silo dug was 10 feet deep, 10 feet wide, and 75 feet long. The ground in which it was dug was practically level. The silo was filled in October with sorghum silage cut to a length of about one-half inch with an ordinary blower cutter having only one joint of vertical pipe. (Fig. 142.) The silage was kept well tramped down, especially along the side walls. When the silo was heaping full above the ground it was covered with about 6 inches of pasture clippings to keep the dirt from sifting through on the silage, and a team and slip scraper were then used to add a layer of about 4 inches of dirt. The dirt was wet down to make it pack and a caterpillar tractor was run over it at intervals of several days. The dirt next to the side walls was kept tramped down to make it follow the silage as it settled.

This silo was opened for feeding the last of December. Feeding was started from one end and a narrow section of the silage was fed out from top to bottom, only enough being opened up at a time to last about two days. About 2 feet of water had accumulated in the bottom of the silo and this was pumped off. As water accumulated from rainfall during the winter it was pumped off or dipped out. Practically no silage was lost from spoilage. It had a bright color and good aroma immediately underneath the dirt cover, even on the end slopes where the depth was less than 1 foot.

Another silo was dug in 1927 in a location where a strong seep developed. At the time this silo was opened there was about 5 feet of water in the bottom. This water had to be pumped out every other day in order to feed out to the bottom of the silo, an operation which proved to be expensive. One or two feet of the silage in the bottom became water-logged and rank-smelling, but when fed with cottonseed

meal it was not refused by cattle although the seepage of such large quantities of water through it had probably caused a considerable loss of nutrients. This silo was again used successfully in 1928 but with the same trouble from water.

### Choice of Location Important

In 1929 a third silo was dug in what was considered an ideal location. The main part of the silo was in fairly level land but one end opened into a deep ravine. (Fig. 143.) Drainage was provided by gravity through a short ditch. This silo was dug with a tractor pulling three slip scrapers, and most of the earth was moved on the level or downhill into the ravine. Three men and the tractor dug this silo to a capacity of



FIGURE 143 — Filling the original trench silo at the McNeill Experiment Station

130 tons in four days, with no expense of construction except for tractor and man labor. The water in the bottom of this silo has been drained as fast as it has accumulated, causing no trouble or expense whatever. The quality of the silage has been as good as any ever seen by the writer, the aroma being particularly mild. Cattle have eaten it greedily at all times without the addition of cottonseed meal.

As the location of the first two silos was such that they could not be drained by gravity, handling the water accumulating in them presented a problem until the very simple expedient of boring a hole in the bottom and letting the water drain off into the water table below was tried. An ordinary curb well auger was used to bore 23 feet to strike sand under the second trench silo, the drainage of which was particularly poor. The water was then turned into this well through a pipe with a strainer on the end. This took care of seepage water in

the silo where it had previously been necessary to pump every other day. When mud was allowed to wash into the well the drainage was stopped up but could be restored by jabbing with a pipe. The writer continued to use this silo but it was not so satisfactory as either of the other two.

As the original silo, in a level location, had some seepage in addition to the direct rainfall, a well was bored (fig. 144) in the bottom of it to a depth of 15 feet to strike sand. This well handled the water without further trouble. Such drainage will solve the water problem in locations where the water table does not rise above the bottom of the silo. The selection of a properly drained site near the fields where the silage

is produced may be a more important consideration than nearness to the barn. This is particularly true in the South where barn shelter is not necessary for cattle. Dairy cattle may have their concentrated feed while being milked and then can be turned out to go to their roughage. This plan saves the labor of hauling the roughage to the barn.

Surface drainage is easily accomplished by ditches, and with bottom drainage provided for there appears to be no good reason for building a roof over the trench silo. This would be expensive and would be in the way of both filling and feeding. The direct rainfall seeping through the



FIGURE 143.—Trench silo of 130 tons capacity, dug by three men with tractor in four days. Ditch for gravity drainage is in left foreground.

silage may cause a slight loss of nutrients but it will keep the silage moist and in good condition. Many above-ground silos are erected without roofs, the silage taking up all the direct rainfall.

#### Small Cost in Proportion to Capacity

The only serious objection commonly advanced against the trench silo is the accumulation of water, but this objection has now been overcome. There are many advantages, particularly the economy of construction. A trench silo may be dug at odd times. No materials need be purchased and no skilled labor is required for construction. The trench silos described were constructed at a cost of 58 cents per ton capacity, which was materially less than for other forms of silo con-

struction. With proper care in filling and tamping along the side walls, no appreciable spoilage occurs in the trench silo. Less expensive machinery is required for filling this type, as the cut silage does not have to be elevated by power but can drop into the silo by gravity. The silage is also easily removed; if desired, a carrier may be installed, as illustrated in Figure 144. The silo is storm-proof and can not rot down. In six years' use the only cost for maintenance has been to clean out the bottom before filling. No serious caving has occurred, and any slight caving is not a real depreciation since the silo is slightly larger after the fallen dirt has been cleaned out.

If silage-cutting machinery is available at moderate cost in the neighborhood, trench silos can be dug and used successfully for herds as small as five or six cows and have been operated with success for one cow. The growing popularity of the trench silo has been almost spectacular. Several hundred trench silos have gone into use in Mississippi alone in the last three years and one county in Tennessee reports 50 dug in one year. No failures have been reported where proper drainage was provided.

S. W. GREENE, *Bureau of Animal Industry.*

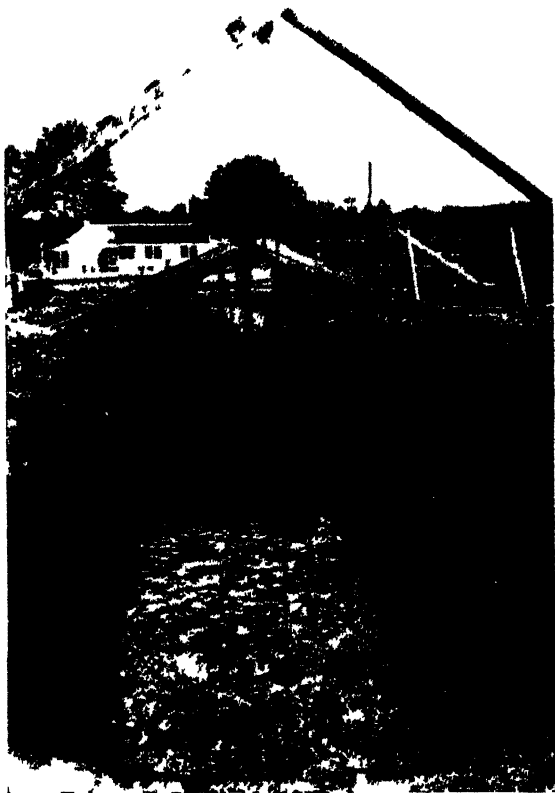


FIGURE 144—Trench silo with well boring outfit in foreground. Feed carrier and track are in background.

## TUBERCULOSIS Becomes a Serious Menace to the Poultry Industry

1927 indicated that tuberculosis was present in poultry flocks in more than 500 counties in these States. The badly infected areas have now extended until they embrace at least 750 counties, causing an enormous

Fowl or avian tuberculosis is becoming a serious menace to poultry raising, particularly in the Middle Western States. Surveys made in

loss of poultry, as well as of swine, which also are very susceptible to the fowl type of tuberculosis. Since disease in a flock increases the cost of production, sometimes to a point greater than the selling price of the product, it is imperative that all unnecessary losses be checked in order to save the industry from serious loss. As a means to this end Congress, in 1931, increased the tuberculosis-eradication fund so that more attention could be given to the eradication of fowl tuberculosis.

Plans for this effort were soon promulgated by representatives of the various poultry interests and by State and Federal livestock officials. These plans provide for cooperation between State and Federal livestock officials and all branches of the poultry industry. One phase of the plans provides that the work be conducted in restricted areas, where an employee of the State or Federal Department of Agriculture can visit each flock and demonstrate to the owner the presence or absence of tuberculosis by clinical inspection, tuberculin testing, or post-mortem examination.

### Disease Spreads in Various Ways

The disease is spread from flock to flock by the exchange of infected fowls which, however, may appear to be in perfect health. It may also be carried on shoes or grain sacks from infected pens. It does not appear that the disease is spread to any great extent by such birds as the English sparrow. The pigeon, however, is a carrier as it is susceptible to this type of infection. There seems to be but little danger of incubator chicks spreading infection, because infected eggs seldom hatch. When they do hatch, the chicks usually die within a few days. In view of these facts it is very important that breeding stock be purchased only from flocks known to be free from tuberculosis or that eggs be purchased and the stock raised under carefully guarded conditions.

### New Ground Desirable for New Flocks

It is advisable to raise new flocks on clean grounds and to dispose of the entire flock at the end of the laying season or when the birds are about 18 months of age. Sanitation is important since the tubercle bacilli may live in protected places for a year or more. Disinfectants may be used to advantage on poultry houses and equipment, but it is not practicable to attempt to disinfect the ground over which the poultry range. Runs and pens should be plowed up and planted to some green crop whenever possible. An approved type of poultry house makes it easier to combat the disease. These recommendations, when followed, will greatly reduce and eventually eradicate tuberculosis and also many other diseases.

### Symptoms of the Disease

Flock owners should acquaint themselves with the symptoms of this disease so that it may be detected before extensive infection in the flock has occurred. The most common symptoms of fowl tuberculosis are ravenous appetite, general emaciation, extreme weakness, swollen joints, and pale wattles and comb. A diagnosis may be made by applying the tuberculin test which, however, should be done by a competent veterinarian. The lesions commonly found are yellowish white nodules (tubercles) in the liver, spleen, and intestinal wall.

The size of the lesions ranges from that of a small grain of sand to that of a hazelnut.

During the last fiscal year, the veterinarians engaged in the eradication of bovine tuberculosis inspected, as an adjunct to that work, approximately 21,000,000 fowls and found approximately 9,000 flocks infected with tuberculosis. Whenever an infected flock is located by these field veterinarians the owner is informed of how to eradicate the disease. The percentage of infected swine has been very materially reduced in many sections, a result which indicates that the farmers are following these suggestions.

#### Information Methods Used

Information on fowl tuberculosis and its eradication is being disseminated through the press and local publications and by posters and exhibits. Figure 145 illustrates a part of an exhibit used in spreading



FIGURE 145—Part of an exhibit, used to show the organs of a fowl that are most commonly affected with tuberculosis. An automatic lighting device first shows a seemingly normal hen, at left, and then, by internal illumination, the evidence of disease in the same fowl.

information on fowl tuberculosis. The exhibit is electrically equipped so that it shows an apparently normal bird, and then, after a flash, the same bird with diseased organs clearly visible in their natural position.

The department also has a 2-reel motion picture entitled "TB or not TB," which deals with tuberculosis in poultry and swine. This picture is available for educational work and may be borrowed for such a purpose through the Office of Motion Pictures of the department.

ELMER LASH, *Bureau of Animal Industry.*

## TURNIPS Converted Into Appetizing Sauerkraut in the Same Way as Cabbage

Many new foods have been suggested for the American table, and now comes turnip sauerkraut to take its place on the menu. Turnips are converted into an appetizing dish by the same methods of fermentation that are used in making cabbage sauerkraut. The wide-

spread use of turnips as a fall forage crop on the farm insures a constant source of supply without the extra labor of planting a special crop.

It has been found through experimentation that a very good sauerkraut can be made from medium-sized purple-top turnips. They should be firm, sweet, and juicy, because the proper fermentation and resultant flavor depend upon these factors. As turnips which have a woody or pithy flesh are low in sugar content, and possess a strong flavor or odor, they are not desirable for sauerkraut.

### Method of Preparation

The tops and roots are removed, and the fleshy material is either shredded or ground in order that the juice may be extracted from the plant cells and the sugar subsequently converted into lactic acid. The shredded or ground material is mixed and salted at the rate of 4 ounces of salt to 10 pounds of turnips. The mixture is then packed in stone jars, weighted down, and allowed to ferment.

The sauerkraut may also be packed in glass fruit jars for fermentation, but the lids must remain loose for the first three or four days in order to allow the gas formed in the early part of the fermentation to escape. After the evolution of gas has ceased, the lids are tightened, and the fermentation is allowed to proceed to completion, which will require from three to four weeks.

Turnip sauerkraut may be stored at a low temperature for a considerable time, or it may be canned according to the method outlined in *Farmers' Bulletin No. 1438, Making Fermented Pickles*. Turnip sauerkraut possesses a sharp lactic flavor closely resembling that of good cabbage sauerkraut. Most of the characteristic turnip flavor is lost during the fermentation.

HARRY E. GORESLINE, *Bureau of Chemistry and Soils.*

**TURPENTINE and Rosin Supply Essentials for Numerous Industries** Spirits of turpentine, oil of turpentine, or as more generally known, turpentine or simply "turps" is usually to be found in every country and town home. It is put to a hundred or more uses. Around the farm home it is ever ready, safe, and useful, either alone or mixed with other ingredients, as a liniment for people or domestic animals. Stokes' liniment (white liniment), for example, is an emulsion containing 40 per cent turpentine oil, 8 per cent acetic acid, 1.6 per cent lemon oil, and about 50 per cent water emulsified with the aid of eggs. Other liniments contain turpentine oil, ammonia, and camphor as the principal ingredients. In mixtures with mutton tallow or olive oil and gum camphor, turpentine finds a deservedly wide use as what the doctor calls a "rubefacient" to be rubbed on the chest and throat. It is a convenient article with which to remove greases and fresh paint from clothing. It is also used in wiping up and polishing floors, woodwork, and furniture, as a repellent for moths and vermin, and to clean porcelain ware and glass.

About 90 per cent of the turpentine produced in this country is used in paints and varnishes. The paint and varnish maker uses it for bringing his ready-to-use paints and varnishes to the right consistency and to hold in solution some of the ingredients. The master painter prefers it for mixing and thinning the paint which he puts on houses

and other buildings. The furniture maker is also a large user of turpentine. The makers of wax polishes for shoes, floors, and furniture are the next largest users of turpentine. They use more than 500,000 gallons annually as it is a good solvent for the wax they use and it gives a smooth product which has the proper consistency, dries at the proper rate, and has a clean pleasant odor. Sealing waxes and plastics, chemicals and pharmaceutical preparations, oils and greases, and printing inks are other products in which thousands of gallons of turpentine are used, and minor uses consume a total of more than 60,000 gallons annually.

The individual's use of rosin is perhaps more indirect but none the less real. The paper maker uses nearly 400,000 barrels (500 pounds gross) of rosin annually in sizing papers of all kinds in order that the newspaper will not tear; that goods wrapped in paper may not be so easily spoiled by becoming wet; and that the ink may not spread over the writing paper. About 300,000 barrels of rosin are used each year in making varnish. Many high-priced varnishes contain a large percentage of rosin or rosin compounds. Because of the insufficient supply of fossil resins (nature's modified and durable rosins) varnishes would cost much more were it not for ample supplies of rosin. Rosin-tung oil or rosin-ester-tung oil varnishes are among those in greatest demand.

Soap makers use annually about 225,000 barrels of rosin, some of it in high-grade toilet soaps, to which it gives certain desirable characteristics. The fact that rosin makes a good laundry soap helps to keep the price of such soaps stable, when the cost of fats, oils, and greases would at times raise the price.

Paper making, varnish manufacture, and soap production, the three chief industries in which rosin is used, probably absorb about 90 per cent of the rosin made. There are, however, a number of other industries which consume many thousand barrels of this commodity. Linoleum making takes about 45,000 barrels; rosin oils and axle greases take 55,000 barrels; sealing waxes, pitches, and plastics need 40,000 barrels; foundries take 30,000 barrels in making cores and molds for castings of all kinds; printing inks take 15,000 barrels to give body to the inks; and 25,000 barrels or more are used for various minor purposes such as solder flux, battery seals, cable insulation, roofing, waterproofing compounds, asphalt emulsions, cellar cement, and paint driers. Rosin is also one of the ingredients of dehairing soaps used on the carcasses of hogs after the bulk of hair has been taken off, in order to take off the fine hair not removed in scalding.

Thus do turpentine and rosin, coproducts of the southern plantations and forests, supply essential raw materials for many important industries, and contribute to the individual well-being and comfort of citizens.

F. P. VEITCH, and W. C. SMITH,  
*Bureau of Chemistry and Soils.*

**TURPENTINE Operators to Have Benefit of Forestry Demonstration** A new national forest in Florida, the Osceola, has recently been acquired by the United States primarily to demonstrate the correct handling of a comparatively large area of longleaf and slash pine land for the continuous production of turpentine, saw timber, and other

forest products. This forest will eventually contain 145,000 acres of Government land. Its south boundary extends 15 miles along the main road between Lake City and Jacksonville; its north edge borders the Okefonokee Swamp.

Slightly over two-thirds of the area consists of pine flatwoods from which the original stand of longleaf and slash pine has been cut. In general, there is good reproduction of both longleaf and slash pine, the latter predominating. On a large part of the area there are good stands of poles and older trees just approaching the size for turpentine. There are also decadent older trees which have been turpentine.

Numerous swamps are scattered throughout the pinelands, one large swamp covering about 10,000 acres. These contain a mixed stand of cypress and hardwoods, such as gum and bay. The best trees have been cut, but there remain some good stands of timber merchantable for ties and saw logs.

The unit was put under administration in December, 1929, after the Government had acquired 93,000 acres. Fortunately the area had been under cooperative fire protection with the State of Florida which had erected two towers and a telephone line upon it. These improvements were purchased from the State, and have been supplemented by fire lines and roads for fire-control purposes. During the fire season the forest is manned by the necessary lookouts and firemen, and in 1930 fire losses were held to 1.47 per cent of Government land burned over.

#### Inventory Made of Resources

An inventory of the resources of the Osceola National Forest has been made and a plan for management of the timber is nearing completion. The forest will be managed primarily for production of naval stores on a sustained-yield basis. Timber operations in the pine stands are now confined to completing the turpentine of older trees already cupped and the salvaging of worked-out timber. Cupping of round timber will begin within five years and as the growing stock is built up, the annual harvesting of naval stores will be increased until the forest comes into full production in the course of the next 10 or 15 years. In the meantime, the disposal of large overmature cypress for saw logs and some of the younger trees for railroad ties will yield a good revenue. Management of the swamps will insure such products in the future.

A record of costs has been kept to determine the financial success of this project. The capital investment when purchases and improvements have been completed will amount to about \$850,000. The books show not only the investments, but the operating expenses, depreciation, and income. The forest will be developed according to sound forestry and business principles with the idea of showing not only how such an area can be brought into full production and kept there, but also whether it is profitable to do so.

Recently nearly 1,000 acres of round timber has been purchased on which the Forest Service will concentrate its major work in naval-stores research. Good practices developed here by laboratory methods and applied on the forest on a commercial scale will help to solve the problems of the naval-stores industry.

JOSEPH C. KIRCHER, *Forest Service.*

**VEGETABLE Growing Finds Favorable Conditions in Some Great Plains Valleys** In the western part of the central Great Plains area and in the intermountain valleys immediately to the westward are found numerous locations ranging in altitude from 4,000 to more than 10,000 feet where conditions are almost ideal for raising such vegetable crops as lettuce, cauliflower, peas, beans, and potatoes. To the northward, similar conditions are found at increasingly lower altitudes, where soil, water, and local climatic conditions are favorable. Such areas are usually protected mountain valleys, although often the mountainsides themselves provide suitable conditions.

### Head Lettuce

The chief expansion in the culture of lettuce, cauliflower, and peas has taken place in Colorado, where a considerable industry has developed in the San Luis Valley, near Del Monte, near Avon, and in similar sections. The head-lettuce industry had its origin in 1918, when one farmer raised 10 acres of head lettuce as a crop following potatoes. From this small beginning the industry rapidly developed until in 1926 and 1927 over 13,000 acres of head lettuce was raised. It was during this period that the industry expanded into Wyoming, where a considerable head-lettuce industry sprang up near Laramie. Two years of partial crop failure and unfortunate marketing experiences were responsible for the decline of this particular venture.

The rise of the industry in Colorado is interesting in that it is typical of similar developments of the past in almost every branch of agriculture. Following the discovery that head lettuce could be so easily and profitably grown, many farmers undertook its culture. Most of them had never raised any crop other than potatoes and knew little or nothing of the cultural requirements of head lettuce, nor did they have the necessary equipment or marketing facilities. Under such conditions it was inevitable that many should fail in their earlier attempts. Overproduction of lettuce, inferior in quality, together with keen competition from California, Idaho, Washington, and other States that market their crop at the same time, all combined to eliminate the inexperienced growers and those who had taken up the enterprise as a speculation.

At the present time head lettuce and the other crops named are largely raised as a part of a general crop rotation. When new land is to be brought under cultivation it is first cleared of aspen or sagebrush, plowed, and a crop of potatoes raised the first year. These may be followed by head lettuce or by one of the other crops. The more progressive growers include alfalfa or sweetclover in the rotation. The former is generally preferred, since it furnishes feed for livestock and the later growth may be turned under as green manure.

Practically no commercial fertilizers except phosphorus carriers are used. It is sometimes applied to land showing a marked deficiency. When available, manure from a feed lot is the most commonly used fertilizer.

Soils selected for head lettuce are usually dark, rich, and loamy. They are most often found where aspen has been cleared. They contain considerable organic matter in the form of leaf mold, but this is rapidly exhausted under cultivation and must be replaced. Lighter types of

soil are sometimes found satisfactory but are generally considered the cause of tipburn. Where early fall freezes are likely to occur, land with a slight slope is preferred to the level land of the valley floor.

New York (also known as Wonderful, Los Angeles Market, Iceberg, etc.), is the most popular variety of lettuce grown. Iceberg is sometimes planted as a variety that is more likely to mature satisfactory heads during warm weather. The true Iceberg, however, is not as popular on the market as the New York type.

Practically all of the head lettuce is raised under irrigation. This may be of the surface, subsurface, or semisubirrigation type. Surface irrigation by means of furrows is by far the most satisfactory. In certain localities, as in the San Luis Valley, the water table is naturally high and subirrigation is practiced. This is accomplished by means of a large ditch surrounding or running through the field, raising the natural water table to within reach of the roots. In the semisubirrigation type the water table is raised as far as possible by means of subirrigation and the irrigation is completed by furrow surface watering.

### Cauliflower

Cauliflower succeeds well at elevations of from 4,000 to 5,000 feet above sea level. At higher elevations the cold nights and often cool days retard its growth.

For its best development, cauliflower requires a somewhat heavier type of soil than lettuce. It also requires a high percentage of organic matter, and applications of 20 tons or more of manure per acre are common.

Most of the cauliflower grown is of the Snowball type. The Colorado Agricultural College in its trials conducted at Fort Collins found the Improved Self-Protecting Snowball to be a very satisfactory strain.

Cauliflower requires a great deal more water than lettuce; its culture, therefore, is limited to localities where water is plentiful at all times. Any shortage of water, especially while the plants are nearing maturity, is almost certain to result in a poor crop.

The exact extent of the cauliflower industry in this region is difficult to determine. Carlot shipments from Colorado totaled 411 cars in 1927 and 843 cars in 1928.<sup>6</sup> Probably the more important shipping points have not greatly changed since 1925, when Denver, Mesita, Pueblo, and San Acacio were the four most important.

### Peas

Peas are the last of this group of crops grown extensively in this section. Here the climatic, water, and soil conditions seem especially favorable. The quality of peas is excellent because of the relatively cool weather found at these altitudes, which retards the conversion of sugars to starches. Marketing is also made easier, in that the pods may be left longer on the vines without injury after they attain edible maturity.

Considerable interest has been manifested in the production of peas for canning. At the present time, however, the most popular variety grown is the Dwarf Telephone or similar types. As this variety has rather large peas, and the public has been educated to associate small-

<sup>6</sup> U. S. Department of Agriculture, Statistical Bulletin No. 30.

ness of size with high quality, the canners hesitate to try to overcome this long-established prejudice. Conditions are exceptionally favorable, however, for growing peas for seed for those growers who are willing to plant improved strains and to give adequate attention to roguing off-type vines.

In 1925 the car-lot shipments of green peas from Colorado totaled 35. In 1927 shipments had increased to 149 carloads, and 348 carloads were shipped in 1928. These increases indicate a rather rapid development of the industry.

### Dry Beans, Potatoes, and Seed Peas

The development of the high-altitude vegetable-growing industry in Wyoming is somewhat typical of what has taken place in other States of the central Great Plains area and the Intermountain region. While a diversity of crops is produced in small quantities, the main development has been in the raising of dry beans, potatoes, and to a lesser extent seed peas.

The Pinto and Great Northern varieties of beans are raised under dry-land conditions on the Plains at altitudes around 6,000 feet. In the Big Horn Basin region considerable acreage is devoted to raising the Great Northern variety of bean under irrigation. Here, too, are raised some 10 varieties of peas and from 10 to 15 varieties of beans for seed. Some bean and pea seed is also raised in the Converse County area.

The bean industry has expanded from the production of 4,712 bushels in 1919 to a production of 726,000 bushels in 1930. Freedom of the crop from anthracnose has interested eastern seed companies in the possibility of securing their bean seed from this region.

The Bliss Triumph is the principal variety of potato grown in Wyoming, and probably accounts for 75 per cent of the total acreage, of which the remainder is mostly devoted to Irish Cobbler. Much of this acreage is used in raising certified seed, Laramie, Goshen, Platte, Niobrara, and Converse Counties leading in its production. In 1930 there were 2,306 carloads of potatoes shipped from Wyoming. It is estimated that of this number approximately 400 cars were shipped as certified stock. All potatoes raised for seed purposes are grown under dry-land conditions, while the commercial table stock is largely grown under irrigation. It seems likely that future expansion of the industry will be largely in the production of certified seed for the more southerly potato-producing areas.

M. F. BABB, *Bureau of Plant Industry.*

**V**EGETABLE Standardization and Variety Description Project is in Progress

For many years there has been great confusion about just what characteristics a certain variety of vegetable should possess.

There has been no authentic standard which seedsmen could use as a guide in producing seed stocks and which a grower or dealer could use as a basis for his conception of a variety. Ample evidence of this lack of agreement and of the absence of such standards is the many differently appearing products that growers obtain, all under the same varietal name. Vegetable growers, canners, and seedsmen have long

recognized the need of definite standards and adequate descriptions of the most important varieties; they have further recognized that only after such standards have been established can uniformity be expected in the offerings of seed in the trade.

Active work upon a standardization and varietal description project was begun in 1929 by the Division of Horticultural Crops and Diseases of the Bureau of Plant Industry.

In order to establish a standard that will be useful all over the country, it is necessary to work on a nation-wide scale in as many of the important vegetable-producing regions of the country as possible. The varieties for which standards are to be established are being grown over a wide range of conditions, so that their behavior and characteristics can be determined in different locations. Precautions have been taken to prevent local or provincial opinions taking the place of broad national viewpoints. From the first, all workers involved in this project have kept in contact with the industries they are trying to serve. The opinions of various qualified vegetable growers, canners, seedsmen, and experiment-station workers in many different parts of the country are being utilized, and the final results are intended to show as accurate a cross section of the country's opinion as it is possible to obtain.

#### Nineteen Experiment Stations Cooperating

The cooperation of 19 State experiment stations, scattered from Canada to the Gulf and from the Atlantic to the Pacific, has so far been enlisted in this project. The State workers have contributed greatly to the value of the results obtained, and the Department of Agriculture gladly acknowledges the splendid cooperation that has prevailed throughout this work. With the assistance of the vegetable-research committee of the American Seed Trade Association, a wide search has been made of American and European sources, and hundreds of stocks have been obtained from most of the actual producers of seeds of the crops under consideration.

The standard to be established for each variety is to be based upon and illustrated by material that is actually in existence, rather than upon an ideal specimen that would be so perfect as to be practically impossible of attainment. Ideal specimens and details of varietal characters are to be well illustrated, using natural colors when necessary.

Tentative descriptions and illustrations have been completed recently upon 18 of the most important market-garden and canning varieties of peas, namely: Alaska, Alderman, Daisy, Davis Perfection, Gem, Gradus, Hundredfold, Improved Advanceer, Laxtonian, Laxton Progress, Little Marvel, Nott Excelsior, Surprise, Sutton Excelsior, Telephone, Thomas Laxton, World's Record, and Yellow Admiral. The pea-variety studies were carried on at Washington, D. C., and at Sturgeon Bay, Wis.

Three years' field work and the descriptions and illustrations upon cabbage have been completed. Studies were made at Washington, D. C.; Norfolk, Va.; Clemson College, S. C.; Winter Haven, Tex.; Davis, Calif.; Madison, Wis.; State College, Pa.; and Greeley, Colo. The varieties studied up to this time are Early Jersey Wakefield, Copenhagen Market, Early Winnigstadt, All Seasons, Late Flat Dutch, Glory of Enkhuizen, Danish Bullhead, and Wisconsin Hollander.

The tomato varieties under consideration are Earliana, Bonny Best, Globe, Marglobe, Early Detroit, Gulf State Market, Stone, Greater Baltimore, and Santa Clara. The tomato work was carried on by the various collaborators at Ithaca, N. Y.; East Lansing, Mich.; Lafayette, Ind.; Davis, Calif.; Weslaco, Winter Haven, Balmorhea, and Nacogdoches, Tex.; and at Washington, D. C.

In both the spring and fall of 1931 and the spring of 1932, stocks of beet, carrot, and spinach collected from numerous sources in this country and in Europe were studied. A total of about 60 strains of beets are being considered, including the following varieties: Extra Early Egyptian, Crosby Egyptian, Early Eclipse, Detroit Dark Red, Edmand Blood Turnip, Crimson Globe, Half Long Blood, and Long Smooth Blood. Work on beets is in progress at Washington, D. C., in California, Texas, and Virginia. Workers in these same regions and also in Minnesota are studying about 60 strains of the following varieties of carrots: French Forcing, Oxheart, Early Scarlet Horn, Chantenay, Nantes, Danvers Half Long, and Long Orange.

More than 60 strains of the following varieties of spinach are included in the program at present: Virginia Savoy, Bloomsdale Savoy, Long Standing Bloomsdale, Viroslay, Prickly or Winter, Gaudry, Victoria, Triumph, Princess Juliana, and King of Denmark. Spinach studies are conducted at Washington, D. C., and in Texas, California, and New York.

#### Plan of Collaboration

Each collaborator records certain data in detail, gives his personal impressions, and takes photographs of the material, all by a prearranged plan, so that the results of all workers are on such a basis that they can be accurately compared and studied. After the season's work, all collaborators gather and thoroughly discuss and criticize all results and opinions. Tentative standards and descriptions have been prepared for peas, cabbage, and tomatoes, and these have been further subjected to the criticisms of qualified growers, technical workers, and seedsmen so that the comments of these persons can be considered in the final preparation of the results. The tentative standards were before the collaborators during 1931, and each description was carefully checked with the behavior and appearance of each variety in the field to determine how usable and dependable the description is and to complete whatever details might have been lacking. Thus the plan provides for testing the results before they are released for publication. Publication of results upon cabbage, peas, and tomatoes is planned for 1932, but those on carrots, beets, and spinach must necessarily appear later.

As one crop or a group of varieties is completed, additional crops and varieties will be added to the project until all of the more important ones have been considered. By the time it has been possible to go the rounds once it may be necessary to revise and bring up to date standards for crops worked upon earlier; and there should also be an opportunity to add to the lists some of the less important varieties. It will also be necessary to add descriptions of important new varieties which certainly will appear on the market from time to time. It is obvious that the task is one that must continue indefinitely in order to meet the changing requirements of the industries interested in varieties of vegetables and to keep abreast of the times.

It is believed that the establishment of authentic standards which are adequately illustrated and described will encourage the production of stocks having higher degrees of excellence and will afford valuable guidance for persons interested in improving the nature of their stocks. There should also be a tendency for seed producers to concentrate upon varieties of importance, and there will be far less argument and confusion concerning what characteristics any important variety should show.

VICTOR R. BOSWELL, *Bureau of Plant Industry.*

**W**HEAT Bred to Resist Some Strains of Bunt May Succumb to Others Marquis wheat has been grown for years in the spring-wheat region in general and has been considered rather resistant to stinking smut (bunt). During the last five or six years, however, it has suffered severe attacks. For several years little smut appeared in the Redit and Albit varieties, bred in cooperative experiments at the Washington Agricultural Experiment Station particularly for bunt resistance, but more recently these varieties have sometimes been smutted. Cooperative studies at the Washington station show that these apparent changes in resistance are not due to deteriorations. When care is taken that they are exposed only to normal conditions in the regions where they are grown these varieties are as resistant as ever. The increase in the amount of infection is due to new strains of the bunt organisms that either have developed in the areas or have been brought in from elsewhere and are attacking the heretofore resistant varieties.

The plant breeder who is attempting to develop new wheat varieties resistant to bunt is vitally concerned with the number, distribution, and disease-producing ability, as well as the origin, of these different smut strains. If the different smut strains are fixed and do not change, the ones that do not occur in certain regions may be excluded, where practicable, by plant quarantines; and the plant breeder then would have to develop varieties resistant only to those strains present in his region. If the different new smut strains appear spontaneously or originate by hybridization, the problem is greatly complicated. It then becomes necessary to test new varieties for resistance to all the known strains of the disease, and the breeder's job is long and continuous.

#### Caused by Two Species of Fungi

Stinking smut or bunt of wheat is caused by two species of parasitic fungi known by their Latin names *Tilletia tritici* and *T. levis*. These two species resemble each other closely and can be distinguished only with the aid of a microscope. Under the microscope the surface walls of the spores of *T. tritici* appear rough or reticulated, while the surface walls of the spores of *T. levis* are smooth. The smutted kernel or bunt ball is a mass of several million of these spores, the reproducing bodies or "seeds" of these parasitic plants. The spore masses break up and the spores become attached to healthy wheat kernels during threshing and subsequent handling. When such smut-infested kernels are sown, the spores germinate with the seed. In germinating, each spore produces a short germ tube which bears at its tip 8 to 24 minute spores of another sort called sporidia. Recent cooperative studies at the

Washington Agricultural Experiment Station have shown that a culture from a single sporidium can not infect wheat plants, but that cultures from two sporidia, properly selected, can cause normal infection which finally results in the production of new spores. This means that what corresponds to sex exists in these smut fungi and that proper mating is necessary for reproduction. This mating is similar in its results to pollination or the union of sex cells in such plants as wheat and corn. When different strains of such higher plants are cross-pollinated, progenies result which differ from either parent, but combine parental characteristics in different ways. Some of these new hybrids also may possess characteristics not apparent in either parent. The same thing happens with the stinking-smut fungi.

### Hybridization is Possible

Careful experiments have demonstrated that hybridization is possible between the different strains of each of the two species of bunt and also between the two species themselves. As spores of both species are commonly found in the same wheat field, and, after threshing, even on the same wheat seed, it is probable that hybridization occurs in nature. This may account, at least in part, for the development of new strains of bunt and for the infection of varieties of wheat previously considered resistant. The appearance of new strains emphasizes both the difficulty of maintaining the resistance of a wheat variety to bunt and the desirability of thoroughly disinfecting new seed from outside sources to avoid introducing new smut strains.

H. H. FLOR, *Bureau of Plant Industry.*

### WHEAT Growers in Central Great Plains Use Three Main Tillage Methods

Three general methods are used in growing winter wheat in the central Great Plains—by continuous cropping, on fallow, and

in rotation with other crops. There is a close relation in this section between the quantity of moisture in the soil at seeding time and the yield, and consequently the methods of seed-bed preparation that are most efficient in storing moisture are likely to be the most successful.

When continuous cropping is to be practiced, it is very important to begin tillage work at the earliest possible date after the crop is removed. Timeliness of the first tillage operation is of more importance than the implement chosen for the work, provided it is a good one and is operated at a reasonable depth.

For the first operation in the preparation of wheat-stubble land for wheat, both the plow and the lister have given good results. The latter has given slightly the higher yields, and following its use the surface resists soil blowing a little better.

The 1-way disk and the Killifer chisel have not been used long enough in this section for their value to be fully determined. For three years at the Fort Hays branch station, Hays, Kans., these implements, when used at the same time and depth, have compared favorably with the plow and the lister.

Where such implements as the plow, 1-way disk, or chisel are used to a depth of 5 or 6 inches, the subsurface soil packer is a valuable aid in the preparation of a seed bed. It breaks up the larger clods, closes

or makes smaller the air pockets in the furrow slice, and retards the loss of water by evaporation. It also firms the soil over the straw and shattered wheat, keeping both damp for a longer period, thus accelerating decay of the straw and germination of the seed.

Where the lister is used, the furrows are left open until there is sufficient volunteer wheat or weed growth to justify tillage. The furrows are then leveled with a ridge "buster" or any implement that will do similar work. If there be another growth of vegetation before seeding time, a surface working with the disk or a shallow cutting with the 1-way disk generally makes a satisfactory seed bed. If there be not sufficient moisture after listing to start volunteer growth by the latter part of August, the furrows should be leveled at that time, as it is not best to leave them open too late in the fall or too near seeding time.

### Methods of Handling Fallow

Where the time between the maturity of one crop and the seeding time for the following crop is too short for the storage of a considerable quantity of moisture, fallow generally produces better results than continuous cropping. There are numerous methods of handling fallow. It is not only more economical but gives as satisfactory results to leave the ground in stubble over winter, beginning work the following spring. The ground may then be plowed and thereafter surface worked as may be required to prevent vegetative growth; or it may be listed and later relisted, splitting the ridges, and then be leveled with the ridge "buster" and thereafter surface worked as required. If there is an early growth of spring vegetation, the ground may be disked or 1-way disked and the plowing or listing be delayed until in May. Plowing or listing just before the period of expected heavy rainfall prepares the ground to absorb the maximum amount of the rains.

When wheat is grown in rotations, if it follows a small-grain crop, the same method of preparation may be employed as is used in the preparation of wheat-stubble land in continuous cropping. If the wheat follows corn that has been well cultivated, it may be drilled among the stalks, or if the corn be harvested the ground may be shallowly 1-way disked. If the ground be loose and free from weeds, equally good results may be secured by drilling-in the wheat without any tillage.

Regardless of the seed-bed preparation, there should be sufficient surface tillage to prevent vegetative growth. Implements that will leave the surface slightly rough and cloddy should be selected for this tillage, so far as possible. This prevents soil blowing and favors the absorption of water.

A. L. HALLSTED, *Bureau of Plant Industry.*

**W**HEAT in U. S. Attacked By Three Smuts, Two of Them Widely Distributed  
Wheat is attacked by three smuts: Stinking smut (bunt), loose smut, and flag smut. Stinking smut and loose smut are widely distributed in all wheat-growing areas in the United States, while flag smut is known to occur only in a limited territory.

### Stinking Smut

Estimates made by the Department of Agriculture in cooperation with officials of various States indicate that owing to stinking smut or

bunt there is an annual reduction of more than 18,000,000 bushels in the wheat crop of the United States. The estimated annual field losses from stinking smut are given in Figure 146.

As indicated by its common name, this smut gives off a foul, fishy odor. When the smut is present in wheat to any considerable extent, this odor permeates the entire mass, and the smut and odor can be removed only by special cleaning and washing. The cost of this cleaning and washing is reflected back to growers through discounts or in some sections by a generally lower price for all wheat. Discounts may run from 3 to 10 cents or even more per bushel. To losses in yield, therefore, must be added the market discounts for smut, which may range from \$45 to \$180 per carload, depending upon the amount of smut. Taken together, the field and market losses from stinking smut of wheat, even at moderate wheat prices, amount to well over \$15,000,000 annually in the United States.

#### Survey in Four States

In 1930 a cooperative survey in four wheat-growing States showed an average loss in yield of 2.8 per cent from stinking smut. This loss, together with market discounts, represented a total loss from smut of about \$5,000,000 to the wheat farmers of these States alone.

In one county in Nebraska, where detailed records were kept from 1926 to 1930, it was found that stinking-smut losses averaged \$237,590 annually. In 1930 the loss from this disease on 1,000 farms in that county averaged \$276.87 per farm, or considerably more than the average annual taxes on the 1,117 farms in the same county. If surveys could be made in all wheat-growing areas, it is likely that similar losses would be found in other States.

Data from five terminal markets show that 23.1 per cent of all the cars received at these markets were graded smutty in 1928. The following year this percentage was 25.3, and during the first three

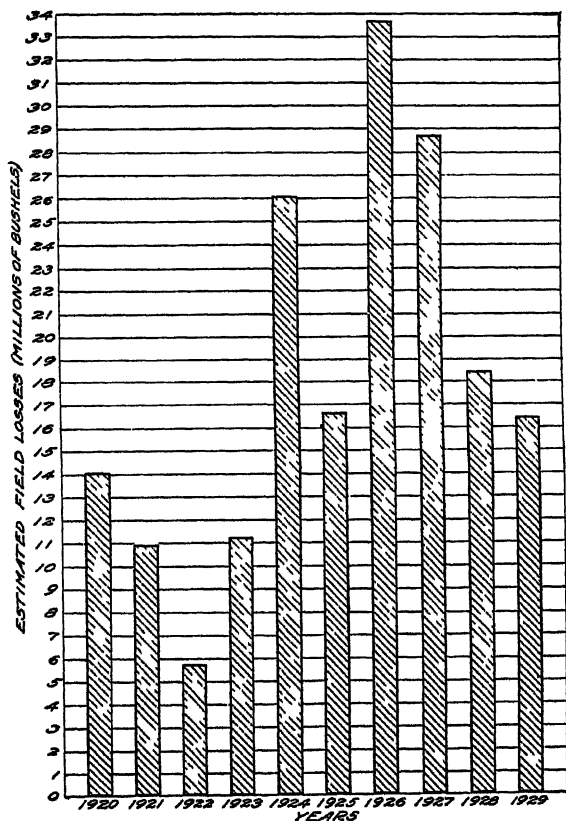


FIGURE 146—Estimated annual field losses from stinking smut of wheat in the United States from 1920 to 1929, inclusive

months of 1930 the percentage was 31.1. It appears, therefore, that losses from this wheat disease are increasing.

Recent experiments have demonstrated that the field loss from stinking smut is directly proportional to the percentage of smutted grains. The smut replaces grain that would have been produced without additional cost to the farmer. Further, it was found in the survey previously referred to that about 1 per cent or more of smutted heads in the field makes the threshed wheat grade smutty at the elevator. The clean wheat is contaminated by smut in threshing, and the entire crop is subject to a market discount if enough smut is present. It costs the grower about as much to produce an acre of smutty wheat as to produce an acre of clean crop, but he gets a lower return in both yield and price. Eliminating smut from the wheat crop is a direct gain to the farmer.

### Loose Smut

Loose smut of wheat causes an estimated annual loss in the United States of about 10,000,000 bushels. The extent of these losses is

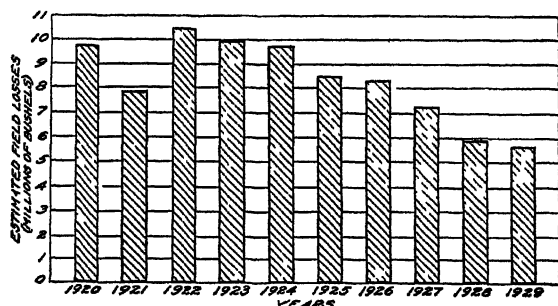


FIGURE 147—Estimated annual losses from loose smut of wheat in the United States from 1920 to 1929, inclusive

not often realized, because the smut on the head is noticeable for only a few days before it blows away. At harvest time there remains only the naked central stalk of the head at the top of the straw.

While this smut occurs in all parts of the United States, it is rather rare in the arid Western States. On

the other hand, loose smut is rather destructive in the more humid eastern wheat-growing regions, where it causes losses of as much as 40 per cent in some fields. The estimated annual losses from loose smut in the United States for the 10-year period 1920–1929 are shown in Figure 147.

Losses from loose smut are a direct reduction of the field yield, due to a reduction in the number of sound heads of grain. In addition, it has been found from field experiments that wheat plants infected with loose smut winterkill more easily than uninfected plants.

### Flag Smut

Flag smut was found in the United States in 1919, near Granite City and East St. Louis, Ill. Later observations have revealed its presence in several counties in Illinois and Missouri in the vicinity of St. Louis and in several counties in Missouri and Kansas near Kansas City. It is known to occur still in these areas of all three States.

In the United States losses from flag smut have been heavy only in individual fields of Harvest Queen wheat, which is very susceptible to this smut. In such fields, losses as high as 30 per cent have occurred. In resistant varieties the losses have been low. In some sections of Australia, flag smut destroys from 5 to 70 per cent of the plants in in-

tested fields. Both in Australia and in the United States flag smut is able to live in the soil from one crop to the next when wheat follows flag smut infected wheat. Under these conditions seed treatments do not prevent infection.

While the areas infested with this disease in the United States are localized near the two original centers, there is no assurance that infected straw or seed may not be taken into other wheat-growing localities through the channels of commerce and thus spread the disease. The greatest danger from flag smut in the United States is in its possible spread to the more arid Western States, where susceptible varieties of wheat are grown under climatic conditions favorable to the disease, and where continuous wheat culture is practiced. There is also the menace of this smut spreading to uninfested sections, particularly in Kansas and Oklahoma, where Harvest Queen is the principal wheat variety.

The seriousness of the wheat smuts as factors affecting the economy of production must not be minimized. Even with limited infections the aggregate loss in the entire crop of the country is enormous. Most of this loss can be prevented by control measures.

J. A. FARIS, *Bureau of Plant Industry.*

## WHEAT Loose-Smut Infection Prevented By Arid Climate

Loose smut of wheat, commonly called "smut" or "blackhead," is different from stinking smut and flag smut, the other smuts of wheat. This smut is very noticeable just as soon as the wheat heads out. (Fig. 148.) The diseased heads are almost completely destroyed by the smut. Instead of normal wheat chaff and flowers, black masses of smut, composed of the spores or "seeds" of the smut fungus, appear along the central stalks of the heads. The spores are easily shaken from the smutted heads, and very soon after heading the latter appear as bare stalks only. The spores may be carried for long distances by the wind or by insects or other agencies. This distribution of loose-smut spores takes place most abundantly at about the time the healthy wheat is in bloom. Some of the spores may lodge between the glumes or chaff of the sound wheat heads, where they germinate and grow into the very young wheat kernel inside the chaff. The smut fungus lies dormant in the mature kernel, but it resumes growth as the kernel germinates and spreads upward into the tender tissues of the developing wheat plant. Finally, when the wheat heads form, the fungus invades them and entirely destroys everything but the central stalk, masses of dustlike black spores taking the place of the flowers.

As the fungus is carried inside the seed, surface disinfectants that control stinking smut and other surface-borne smuts will not control loose smut. To be successful, a treatment must penetrate and kill the fungus without killing the seed. The hot-water treatment meets these requirements, but it is so difficult to apply that it is rarely used. Furthermore, it frequently causes some injury to germination. The most that can be expected from the hot-water treatment is the cleaning up of enough seed for a clean seed plot to serve as a source of seed for a larger area.

## Control by Dry-Air Conditions

Recent studies in cooperation with the Idaho Agricultural Experiment Station have shown that, in the arid regions of the West, loose smut in wheat is controlled in nature by dry-air conditions when the plants are in bloom. This is the period when inoculation normally takes place, the smut dust or spores being blown from heads. Because of insufficient moisture in the air, the smut spores are unable to germinate in the flowers and infection does not take place. This relation to moisture in the air accounts for the prevalence of loose smut of wheat in the humid parts of the country and under irrigation, and for the rare occurrence of this disease in the dry-land areas of the West.

The only feasible method of controlling loose smut in the areas where it is serious is the use of seed free from infection. The alternative of the hot-water treatment is special seed plots protected against infection, the clean seed for these plots being either treated with hot water or obtained from an area known to be free from the disease. The difficulty of the hot-water treatment even on a small scale makes preferable the seed from a known disease-free source.

In the case of varieties grown in both humid and arid areas, disease-free seed should be easily obtainable. Where the humid-area variety can not be obtained from arid sources, arrangements might be made for specially growing the pooled requirements of a number of farmers. Handled through a county farm bureau, a county agent, or other similar agency, a satisfactory arrangement could be made at a reasonable cost. The knowledge of humidity requirements governing infection also should make it possible to adjust irrigation practice in irrigated areas so as to effect natural control.

V. F. TAPKE, *Bureau of Plant Industry.*



FIGURE 118.—The appearance of loose smut in wheat (right) when the sound heads (left) are in bloom

## WHEAT Loss from Stinking Smut Can Be Reduced by Disinfecting the Seed

Serious losses from bunt or stinking smut in wheat can be prevented by properly cleaning and treating the seed before sowing, except in the dry-farming regions of the Pacific Northwest and possibly in other areas where the soil may be infested with bunt spores. In such areas, while seed treatment does not entirely prevent bunt, it greatly reduces it. Bunt under these conditions may be combated by a combination of seed treatment, cultural practices, and the use of immune or highly resistant varieties. Fortunately, soil infestation is

serious only in a relatively small part of the great wheat-growing area of the United States. Seed treatment, therefore, may be recommended generally as a wise farm practice.

### Cleaning the Seed Important

Seed wheat should be very thoroughly cleaned before any kind of seed treatment is applied. Nearly all wheat as it comes from the threshing machine contains foreign material, weed seeds, other grains, and some small, shriveled wheat kernels unfit for seed. If the crop is smutty, the wheat also will contain many smut balls. Good practice demands that these materials be removed from the wheat before it is treated or sown. It is doubly important to remove the smut balls before treatment; otherwise the seed treatment is much less effective. (Figs. 149 and 150.)

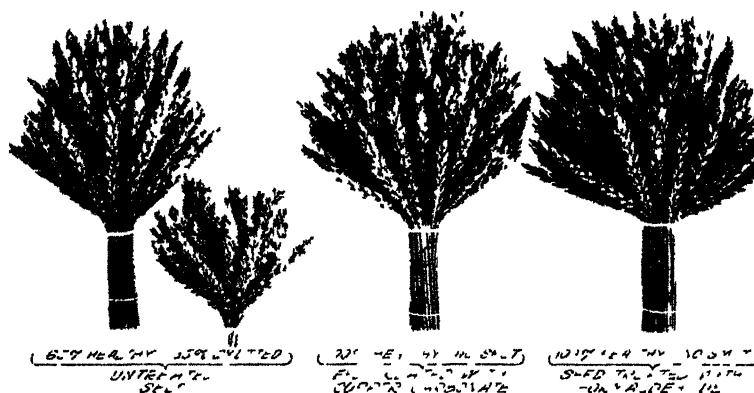


FIGURE 149.—Wheat from seed with smut balls removed before treatment

### What Treatments to Use

After the seed wheat has been thoroughly cleaned and smut balls removed, it is ready for treatment. There are two methods of treating seed grain now in general use—the dry or dust method, and the wet or formaldehyde method.

#### The Dry Method

The chief advantages of the dry method are: (1) It is easy to apply; (2) it does not cause seed injury, even when the treated seed is stored for weeks after treatment; and (3) it protects treated seed from weevils and rodents.

Copper carbonate is the most widely used and, on the whole, the most satisfactory dust fungicide now on the market for controlling bunt. There are two forms in general use—the pure copper carbonate containing about 50 per cent metallic copper, and various diluted or extended brands containing from 18 to 30 per cent metallic copper. The former should be used at the rate of 2 ounces per bushel of seed and the latter at from 2½ to 3 ounces per bushel.

Copper carbonate should be applied to the seed with a machine that thoroughly coats every kernel with the dust. The dust should never be applied by mixing it with the seed on the barn floor or in a wagon box by means of a shovel, or by stirring it into the seed by hand in the drill box. Such methods result in improper treatment and failure to control bunt.

The most common method of applying copper carbonate to seed wheat on the farm is by means of the common homemade barrel type of duster, which is very effective if properly constructed and used. Directions for making an inexpensive duster of this type may be obtained by writing to the United States Department of Agriculture. The barrel mixer is filled to not more than one-third of its capacity with the thoroughly cleaned seed wheat, the proper amount of dust distributed from one end of the barrel to the other, and the mixer turned for about two minutes at the rate of about 30 revolutions per minute. The wheat is then placed in sacks ready for sowing. Two men can treat about 15 to 20 bushels per hour.

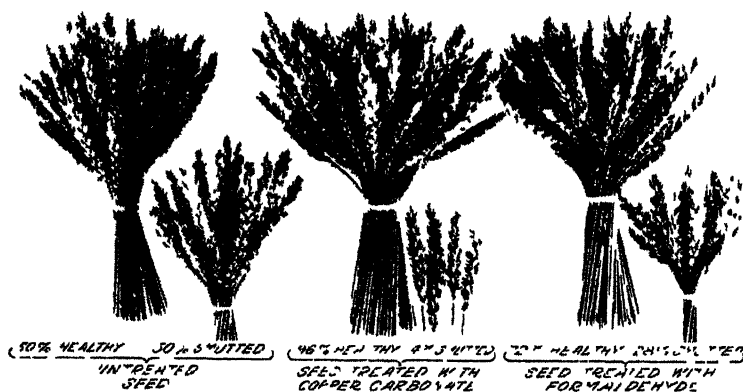


FIGURE 170 — Wheat from seed with smut balls not removed before treatment

For dusting large quantities of seed, there are on the market a number of commercial power dusters with capacities for treating from 30 to 300 bushels of wheat per hour. Some of these can be combined with power cleaners so that both the cleaning and treating are done in one operation.

In some localities wheat can be effectively cleaned and treated for a reasonable charge at a mill or elevator well equipped for that purpose. In several sections of the country portable combination cleaners and dust treaters, which go from farm to farm, have been very successful.

### The Wet Treatment

Formaldehyde solution is the liquid most commonly used in the wet treatment of wheat for bunt control. Before or during seed treatment with formaldehyde all smut balls must be removed from the seed if the treatment is to be effective. The formaldehyde solution does not penetrate the oily material of the smut balls and therefore does not

kill the spores in them. In handling the grain after treatment these smut balls are broken and the seed is again infested with viable spores. The formaldehyde treatment does not protect the grain from this re-contamination as copper carbonate does to some extent. (Figs. 149 and 150.)

The only thoroughly effective way of treating bunt-infested wheat with formaldehyde is by soaking the seed in an open container in a 1:320 formaldehyde solution made by mixing one-half pint of commercial formaldehyde in 20 gallons of water. The well-cleaned seed wheat is poured slowly into the solution and stirred at the same time so that any remaining smut balls may rise to the surface and be skimmed off. After the wheat has been in the solution for about 10 minutes, the solution is drained off and the treated seed spread out on a clean floor or canvas to dry. When sufficiently dry, it should be placed in clean sacks and sown at once. Sacks previously used for smutty wheat should be soaked in the above solution before being used for treated seed. It is well also to wash out the drill box and spouts with the same solution before sowing treated seed.

### Removal of Smut Balls Essential

Soaking the seed in sacks in this solution, sprinkling or spraying the seed with a more concentrated solution, or any other method of applying the formaldehyde treatment that does not include removing the smut balls, usually results in poor bunt control unless the smut balls have been completely removed in cleaning the seed. For the farmer who has much seed to treat with formaldehyde, there are machines on the market for this purpose. Before purchasing a machine, however, he should be certain that it thoroughly wets every kernel with formaldehyde and that it removes the smut balls.

If the smut balls can not be completely removed by available cleaning equipment, it is usually advisable to procure seed wheat that does not have smut balls in it. Such seed wheat also should be treated before sowing, because there might be smut spores on the seed even though no smut balls are evident. It is good insurance to treat the seed every year. Badly smutted wheat should not be used for seed at all.

R. W. LUKEL, *Bureau of Plant Industry.*

### WHEAT Strains Resistant to Flag Smut Afford Best Means of Control

Flag smut appears in the wheat plants in spring as dark-colored stripes running lengthwise in the leaf blades and sheaths. (Fig. 151.) These stripes are first gray in color, and later become black. They are filled with dark-colored spores or "seeds" of the fungus parasite. Infected plants rarely produce normal heads. Spores from these infected plants may become attached to wheat kernels in harvesting and threshing or may fall on the soil. They may be blown by the wind or carried by water or by other means, such as threshing machines or other farm implements, men, or animals, for considerable distances from the infected plants. When smutted wheat is sown or when clean seed is sown in infested soil the smut spores germinate when the wheat germinates, and the young wheat seedlings are penetrated by the minute threadlike germ tubes of the fungus. After entering the seedling

these fungus threads grow up through the tissues of the wheat plant from which they obtain their food. They live in the plant until spring, when they begin to produce the dark-colored spores that are seen as black stripes in the older wheat plant.



FIGURE 131.—Leaf blades and sheaths of wheat plants showing the black stripes caused by flag smut

### Control Measures

Flag smut may be held in check and reduced in quantity by judicious quarantine, seed treatment, crop rotation and other sanitary measures, and by growing resistant varieties of wheat. The percentage of infection is also influenced by soil and weather conditions at the time the wheat is sown. Quarantine and sanitary measures include the regula-

tion of shipments of infected grain and straw; the disinfection of farm machinery, etc., when leaving an infested area; the burning of straw; and the treatment of seed grain. On account of the limited occurrence of flag smut in the United States, a Federal quarantine has been placed against the importation of wheat from all foreign countries where flag smut is known to occur.

### Seed Treatment

Seed treatment will destroy the spores of flag smut carried on the seed. The copper-carbonate dust treatment recommended for controlling stinking smut or bunt of wheat is the most satisfactory treatment. However, none of the seed treatments prevents infection of wheat seedlings by flag-smut spores present in the soil.

### Sanitary Measures

Because flag-smut spores easily survive in the soil from harvest to seeding time and are present to infect fall-sown wheat, it is especially important that infested fields be sown to other crops the following year unless a resistant wheat is used. The continuous growing of susceptible wheat on infested land may result in an increase of the disease, as has been found in Australia. Flag smut affects only wheat, therefore any other crop may be grown in the rotation with safety.

Any material that may contain flag-smut spores, such as straw or manure, may serve as a source of infestation when applied to the land. For the best results infested crop residues and infested manure should not be returned to soil that is to be sown to wheat within a year. The safest place in the rotation to apply such material is on the wheat stubble before a crop other than wheat.

### Resistant Varieties

The use of resistant varieties promises to be the most satisfactory means of controlling flag smut. Among the resistant wheats available in commercial quantities for growing in the flag-smut area are Shepherd, Trumbull, Gladden, and Fulhio. A few resistant selections of Harvest Queen have been found, but these are not yet increased for distribution. There are other highly resistant wheats that are less adapted to the infested area. The susceptible wheats that are grown commercially in the infested area and that should not be sown there are Flint (May), Fultz, Harvest Queen (Salzer Prizetaker, Red Cross), Jones Five, and Red Wave. If these susceptible varieties are replaced by resistant varieties that do well in the infested area, serious losses from flag smut should be eliminated.

V. F. TAPKE, *Bureau of Plant Industry.*

**W**HEATS Bred for Smut  
Resistance Combined  
with Yield and Quality

Differences in the reaction of varieties of wheat to smut or bunt have been recognized since 1901.

An almost complete range from immunity or strong resistance to complete susceptibility has been obtained among different varieties. Smut is more injurious to winter wheat than to spring wheat, but since the distribution of certain new varieties, it is becoming more prevalent in spring wheat.

The two species of bunt and strains within each species have complicated the testing of the reaction of wheat varieues. Based upon the infection of different varieties, there appear to be greater differences between some strains of smut within a species than between the species themselves. Martin and Hussar, winter-wheat varieties, were immune from smut in many experiments but recently have been found to be very susceptible to certain strains of smut occurring in the Pacific Northwest. Outside of this section different strains of smut have not become a serious problem to the wheat breeder. Some varieties, such as Oro and Ridit (selected and bred at the Oregon and Washington experiment stations), and Hope (developed in South Dakota) are resistant to almost all of the known strains of smut. Other varieties are resistant to one or more strains of bunt, while still others are susceptible to all known strains. Outstanding among varieties resistant to some strains are Sherman and Regal, hard red winter wheats selected for bunt resistance and distributed from the Sherman County branch station, Moro, Oreg., and Albit, which was developed by hybridization at the Washington Agricultural Experiment Station. Marquis, the principal commercial variety of hard red spring wheat, has some resistance to bunt, and probably less serious losses have occurred in spring wheat than if other varieties had been generally grown in its place. Less smut has been obtained in Hope spring wheat than in Marquis or any other spring variety.

Smut reaction has been studied in numerous wheat crosses involving immune, resistant, and susceptible varieties. The immunity from some strains of bunt possessed by the two winter wheats Martin and Hussar has been found to be inherited in a rather simple manner. In crosses between other varieties the inheritance is more complex and the difficulties of the plant breeder are therefore considerably greater. Aided by an increasing knowledge of the mode of inheritance of bunt reaction in crosses, breeders are producing new wheat varieties which are immune from or resistant to the disease.

Important commercial varieties have been crossed with immune and resistant varieties in order to combine this smut reaction with other desirable characters such as high yield, rust resistance, and good milling and baking quality. Many hybrid strains thus developed are now being tested for yield and quality and for resistance to bunt. Some of the bunt-resistant varieties already developed, particularly Ridit, are grown to a considerable extent on farms. The development and growing of resistant varieties is a promising method of smut control, particularly for those areas where soil infestation reduces the effectiveness of seed treatment. However, when resistant varieties are grown, seed treatment should be practiced every few years to control infection in susceptible mixtures in the variety or the increase of any virulent new form of smut.

J. ALLEN CLARK, *Bureau of Plant Industry.*

## WHEAT'S Deterioration in Farm Storage Bin Tested Experimentally

The principal reason for wheat's going out of condition while in storage is high moisture content. This moisture content can be estimated to some extent by the way the grain threshes and handles. If the grain threshes or combines easily, rattles when handled, and is hard to bite, it

probably is safe for storage. If the weather has been hot and dry, it is a good indication that the wheat is dry. While in storage the grain should be examined from time to time for odor, temperature, and weevils.

When wheat goes out of condition, the germination is decreased, the rancidity—which is a measure of soundness—is increased, and the grain becomes musty, sour, and hot. Grain in this condition is unfit for making flour. Wheat in various stages of deterioration adds to the problem of marketing. The difficulties in grading during the years of wet harvest seasons are greatly increased.

During the summer of 1930 about 100 bushels of damp wheat containing approximately 17 per cent of moisture was placed in a small farm-storage bin at Arlington farm, an experimental farm of the department near Washington, D. C. The bin was equipped with electrical resistance thermometers, so that the temperature in its various parts could be determined.

The average temperature of the wheat on August 22, when the wheat was placed in the bin, was 78° F. For several days the temperature of the wheat varied somewhat according to the temperature of the outside atmosphere. Fifteen days after the wheat was placed in the bin the temperature of the wheat, 1 foot below the surface, was 101°. Six days later the temperature at that point was 122°. It took 14 days for the temperature of the wheat in that part of the bin to increase from 78° to 101°, an increase of 23°. Six days later the temperature was 122°, an increase of 21°. The temperature of the rest of the bin compared with that of the top portion.

The germination of the wheat at the beginning of the storage experiment was 97 per cent. On September 15, at the end of the test, the germination was 69 per cent for the top portion of the grain. Wheat from the center of the bin germinated 11 per cent and at the bottom showed no germination at all.

The rancidity of the wheat was represented by an index figure of 7.32 at the beginning of the storage experiment. The rancidity index at the close of the experiment was 13.22 at the top of the bin, 24.88 in the center, and 26.27 at the bottom.

The moisture content of the top of the grain on August 22 was 16.5 per cent and decreased to 14 per cent at the end of the experiment. The damage was not so great at the top of the bin, due to the drying of the wheat in this position.

### Drying the Damp Wheat

On September 17 the wheat was taken from the bin and placed in the open air on a platform about 20 feet square. The wheat covered approximately one-half of the platform, which gave room for turning.

The average moisture content of the wheat, when it was placed on the platform, was 16.3 per cent. Eight days later the average moisture of the wheat was 14.5 per cent. The top 2 inches had a moisture content of 12 per cent. The wheat was handled on September 18, 19, 20, and 22; twice on September 26; and once on September 30. On October 1 the top 2 inches of wheat had a moisture content of 12.1 per cent and the average for the pile was 13.6 per cent. On October 23 the moisture content of the top 2 inches was 11.3 per cent and the average of the pile was 13 per cent.

There was practically no rainfall and the humidity of the atmosphere was low during the drying period. If there had been rainy weather with high humidity during this period, or during a part of the time, the drying would have been slowed to some extent.

The practice of spreading grain to dry is common with farmers. In some years when the prices are low and the farm has no storage space, sound, dry wheat is piled on the ground. Wheat stored in this manner for any length of time is usually badly damaged. This damage lowers the grade and the price of the wheat, and causes many marketing complications.

This experiment corroborates what is generally known. It is always best to have the wheat dry enough for storage before it is threshed or combined. Sometimes it is impossible to do this because of a wet

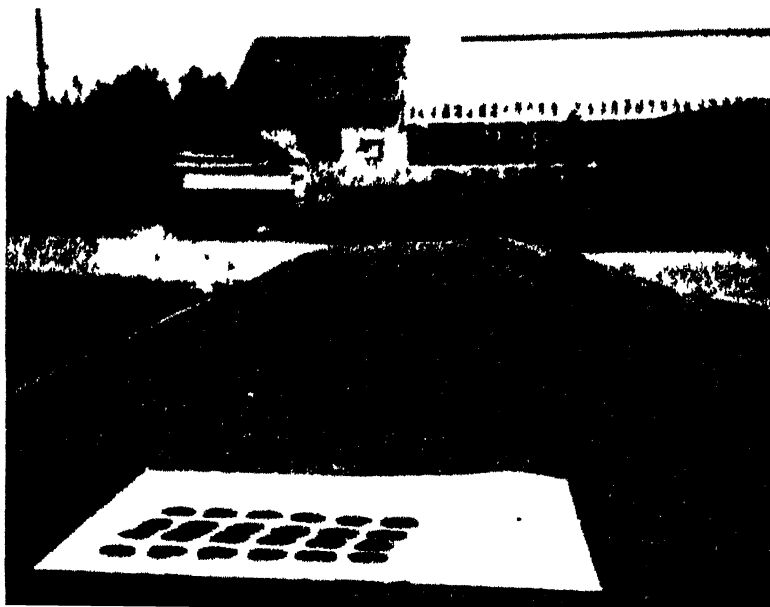


FIGURE 152.—Pile of wet wheat in the open, showing grain tester, sampling cloth and grain from four probes on the cloth

season. During such a year every agency is taxed to the limit to put the wheat crop into proper condition for storage. It is possible to dry some of this wheat by piling it on a platform and exposing it to the sun and wind. The wheat must be handled in order to dry it properly, and must be kept covered with a canvas during rains.

JOHN H. COX, *Bureau of Agricultural Economics.*

**W**ILTSHIRE Sides for Export Should Meet English Requirements

English butchers do not cut up a hog carcass into such common American cuts as fresh pork chops, picnic shoulders, and butts. (Fig. 153.) They

merely remove the shoulder blade, the back, the neck and nitch bones, and put the entire side of pork in cure.

When these cured, smoked "Wiltshire sides," as they are called, are cut up for the English retail trade, the butcher prepares the primary cuts illustrated in Figure 154, then slices off portions of these for his trade as required. The slices are usually thick and may contain portions of the spare ribs, back fat, plate, ham, skin, or other product, depending upon the part of the carcass from which they are taken. A slice of English bacon cut across the loin includes: A portion of the belly, a chop, as we know it in the United States; a portion of back fat; and a section of skin.

Imagine an Englishman's dismay if he should buy a slice of untrimmed loin from a typical well-fattened American lard-type hog. His purchase would consist of about one-third lean, one-half fat, and the rest bone and skin. Exporting that kind of Wiltshire side to England would probably be as unprofitable as trying to sell untrimmed pork chops in this country.

In the United States consumers are less directly concerned with the type of hog. Excess fat on the loin is normally trimmed off by the packer. Frequently that on the ham and shoulder and sometimes that on the bacon are also trimmed off. In England the consumers buy the bacon as it is and protest justly if there is too great a proportion of fat. This has led producers catering to the English market to breed and feed a type of hog that will produce a Wiltshire side with a desirable proportion of lean to fat. This means that the loin must be covered with a moderately thick, even layer of fat. The carcass must be such that a slice of English bacon will be attractive, economical, and not wasteful to the consumer. (Fig. 155.)



FIGURE 155.—Side of hog showing standard cuts in the United States: a, Feet, b, lam; c, bacon, d, loin, e, picnic shoulder; f, shoulder butt, g, back fat

### Wiltshire Sides of Five Countries Compared

American hog producers can meet the requirements of type and finish if they wish to do so. Evidence of this is shown in an importation by the United States Department of Agriculture of 20 Wiltshire sides from the Liverpool market. These sides originated, four in each of the following countries: Denmark, Ireland, Sweden, Poland, and the United States.

These 20 sides were fairly uniform in length but differed considerably in width, thickness of fat over the back, and in thickness and

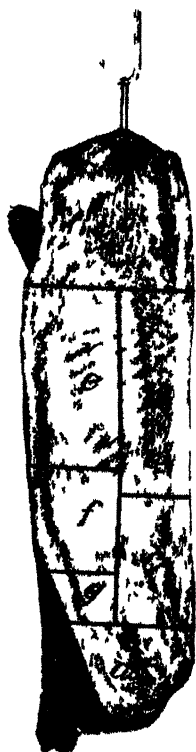


FIGURE 151—Wiltshire side with method of cutting indicated. *a*, Gammon, *b*, fore end, *c*, long loin, *d*, back bacon, *e*, thick streak, *f*, thin streak, *g*, flank.

Denmark, Sweden, and Ireland were milder and more desirable. This was not the case with the gammons. The American gammons were graded a close second, the Danish being slightly more desirable.

The fact that the most lightly cured Wiltshires had remained sound during shipment from the respective countries of origin to England and from England to the United States suggests that a milder cure than that found in the four American sides returned from Liverpool could be used in American sides for exportation to the English market.

proportion of fat in the cuts. The back-fat thickness had a definite influence on the bacon grade, the latter sides being graded lower by the foreign graders.

The best American sides in the shipment compared favorably in quality with those from other countries, as indicated by general appearance, and possessed desirable back fat with respect to average thickness. They showed the greatest variation, however, in thickness of back fat from shoulder to ham. The proportion of lean to fat was as desirable as in any of the other sides. Doubtless there are many market hogs in this country which do not show such desirable export type and finish, but suitable hogs can be produced by those who understand the demands and methods of the English trade and adapt their production methods accordingly.

#### Cooked Meat Tests

These 20 imported sides were cut into the English retail cuts and the loins and hams (gammons, as hams are called in England) were roasted at the Bureau of Home Economics. The cooked meat was tested for palatability by the official grading committee of the department's meat research staff. It is of more than passing interest to note that the American pork, with particular reference to the loins, was almost unanimously declared to be too salty. Loin samples from



FIGURE 155—Distribution of fat and lean in primary Wiltshire cuts: *c*, Long loin, *d*, back bacon, *e*, thick streak, *f*, thin streak. (Cuts are designated with same letters as in fig. 151.)

From observations made on these imported Wiltshires, it would appear that the type of hog necessary for the production of satisfactory Wiltshires closely approaches the type which will produce the most desirable American cuts. Whether the swine grower is raising hogs for export or for the domestic trade, he will find that those possessing quality and a relatively high proportion of lean to fat will find greatest favor at the market. The problems of breeding, feeding, and management must be studied in their relation to the practical production of quality pork whether the final product is to be exported or used at home.

R. L. HINER, *Bureau of Animal Industry.*

## WOODLANDS on Farm an Important Factor in Timber Survey

The farmer owns nearly one-third of all the forest land in the United States. (Fig. 156). But what do the farmer's acres contribute to the total timber supply of the country? How rapidly are his woods being reduced by cutting, tree diseases, insect attacks, fire, grazing, and other means? How much of his timber does the country need? Is the farmer getting full value from his wood lot now, and can he get more?

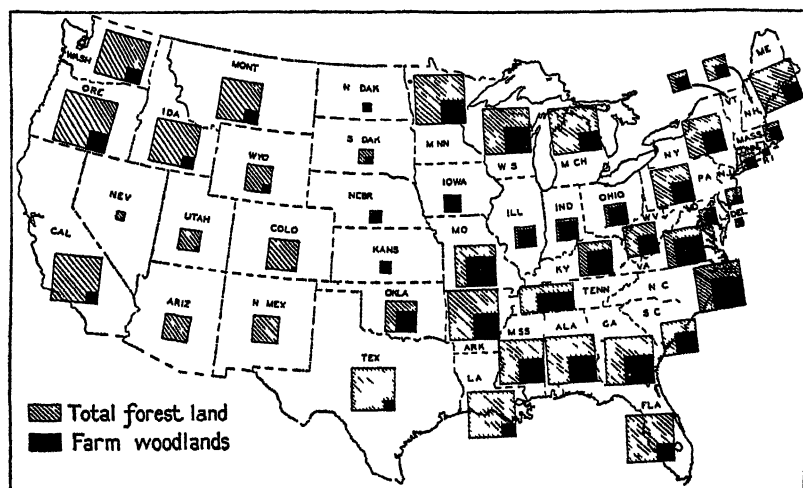


FIGURE 156—The farmer as a timber owner

These are a few of the questions comprised in the one big question: "What are this country's actual timber resources and how do they actually meet present and future needs?" This question has never been answered accurately for the country as a whole, or even for any one State. Forest-conservation policies and practices have been based largely on rough and unreliable estimates, because a census or survey of the country's forest resources and timber needs, broad enough to furnish facts instead of guesses, is a project involving years of effort and millions of dollars.

In 1928, however, Congress passed the McSweeney-McNary Act, grouping all the activities of Federal scientific forest investigation into one big program. Section 9 of this act authorized the Secretary of

Agriculture to spend \$250,000 a year for 12 years, in cooperation with the several States—

in making a comprehensive survey of the present and future requirements for timber and other forest products in the United States, and of timber supplies, including a determination of the present and potential productivity of forest land therein, and of such other facts as may be necessary in the determination of ways and means to balance the timber budget of the United States.

### Survey Well Under Way

The forest survey thus authorized is now well under way. Briefly, it follows four lines of investigation: Stand, depletion, yields, and requirements. First, how much timber has the United States now standing—in mature saw timber, in cordwood, and in young growth coming in on burned or cut-over forestland? Then, how fast are forest use and forest enemies reducing present stands? To balance against the answer to that question, there must be accurate figures showing how fast the present forests are growing—how much wood is grown each year to counterbalance use and loss, and how much might be grown with adequate fire protection and forest management? Finally, how much wood does the United States need, and are its needs increasing each year or lessening? In short, is this country facing a timber shortage or shall it have, as some claim, more than enough wood for all future needs?

The farmer is not only a large timberland owner, and therefore a potential producer of a considerable part of the country's timber supplies, he is also a large consumer of lumber and cordwood. From the survey he will learn a great deal about the location, extent, and character of his own future timber supplies, as well as the part he can play in producing wood for the Nation, and where future markets for farm woodland products will be found.

C. M. GRANGER, *Forest Service*.

# FARM MECHANIZATION

## MECHANIZATION SLOWS AS MORE OUTPUT AND LESS DEMAND LOWER PRICES

Implements and machinery available for use in farming have been an influence of first importance in determining the prevailing type of farming in terms of size of farm, production program, and capital requirements. But the influence that each new invention in farm machinery has had on American agriculture has been closely limited by the nature of the farm land in each part of the agricultural area. Further, machinery alone has always been inadequate to bring about a full-rounded development of the agriculture of any region. There must be an economic motive for the utilization of machines strong enough to make their manufacture and sale profitable and to encourage a period of tedious and expensive experimentation in developing the machinery. In the long run, the demand for the production which the machine facilitates, is the most essential motive in its utilization.

The period since the World War has witnessed a remarkable acceleration in the readaption and use of agricultural machinery, with attendant expansion in agricultural production, both in this country and abroad. Further development in mechanization must be conditioned: (1) By the adaptability of the various portions of our agricultural area to the practical and economic use of new implements; (2) by the extent and character of the demand for the commodities whose production may be increased by the new machines; (3) by the degree of success with which these machines fit into the present organization of farms, or could be fitted into a system reorganized on the basis of the use of new machines and new practices which they induce, and the type of financial and business organization necessary to make their use both technically successful and economically feasible.

In general, the liberal use of machinery has been inseparable from a high degree of commercialization in agriculture. Frequently the invention of a single machine, which met a keenly felt need in the technical processes of production and thus removed an essential limitation to volume of output, resulted in a remarkable expansion in a given type of agriculture.

The most outstanding example in American agriculture probably was the invention of the cotton gin late in the eighteenth century. This invention, with subsequent improvements, was the prime factor in the rapid spread of cotton production. Mechanization in planting

and cultivating cotton never progressed very far until recently. For years relatively low-priced labor enabled growers to furnish a sufficient supply of cotton at relatively low production costs. Shortly after the World War exceptionally heavy boll-weevil damage in the older cotton areas resulted in relatively low production and good prices; and cotton growing in the subhumid sections of Texas and Oklahoma was greatly expanded. These areas are particularly suited to the use of machinery, and here the mechanization of cotton farms has been considerably developed.

Another important example of key inventions releasing forces that make for rapid agricultural expansion was the invention of the reaper early in the nineteenth century. The production of small grains, particularly of wheat, in the earlier times and in more primitive countries, had been characteristic of self-sufficing, small-scale farming. The daily bread of the peasant and the feed for his flocks and herds, so far as they were given rations of grain, depended on primitive hand-labor methods to so large an extent that no very large surplus was produced for market. Russia produced a surplus of grain under primitive technic but large production for export was not forthcoming until there was a considerable utilization of modern tillage and harvesting machinery. In the United States, the first implement to promote rapid development of the Middle West was the steel plow, which facilitated the plowing of heavy prairie soils. Then came the invention of the reaper, the grain separator, and hay harvesting machinery, all within the 30 years before the Civil War. The Civil War, by increasing the demand for food products and making labor scarce, gave impetus that led to a rapid expansion in the use of these machines. Great expansion in the farm area in the upper Mississippi Valley came in the decades following the Civil War, and resulted in a heavy exportable surplus of grain. About this time the binder began to replace the reaper. This period marked the rapid spread of wheat production across the upper Mississippi Valley and into the Great Plains area. It marked, also, the first development of wheat farming on a truly large scale in the Sacramento Valley, the Palouse country, and the Red River Valley. It was in the Sacramento Valley that the combine was first used, and in its early development the steam traction engine was used with it as a source of power.

These developments had a profound influence on types of farming in the various parts of the small-grain region. The mere displacement of man labor by horsepower and machinery did not greatly change the farm organization so far as the human element was concerned. It eliminated the hiring of considerable seasonal labor, but did nothing to displace the family farm. It did much, however, to change the size of the operating unit; because all these inventions increased the capacity of labor. The acreage per man was greatly increased as was also the amount of capital necessary to finance a farming enterprise.

About the opening of the twentieth century the internal combustion engine began to be used on the farm, first as a source of stationary power, then in the tractor, and finally in the truck. This development did not come rapidly at first. It was only with the coming of the World War that universal attention was turned to the importance of the tractor as a source of mechanical power, and that the development of tillage and harvesting implements and machinery to fit this new source of power was seriously considered. During and after the war

there was an important development in perfecting the tractor as a mobile power unit and in developing the combined harvester-thresher. These developments again profoundly influenced the type of farming within the small-grain areas, and significantly shifted the boundaries of the territory devoted to wheat production.

New power and new machinery have again increased the capacity of the farmer in terms of land and capital and they have vastly increased his output of wheat and other small grains. More labor has been displaced, a still larger investment must be made in farm equipment, and the acreage that one man can handle has been increased.

This period has induced a great deal of discussion of the future type of business and technical organization of the farm. A few conspicuous examples of corporations being organized for agricultural production, securing vast holdings of land, and operating on exceptionally large scale, have raised seriously the question whether, with the new type of machinery, the family farm would continue to have a place, particularly in small-grain farming; and whether the corporation, with its greater command of capital and its allegedly higher degree of technical efficiency, would not become the prevailing type of business unit. Statistics lend but little support to such a supposition. There have been comparatively few instances of the promotion and subsequent operation of corporation farms in a manner sufficiently satisfactory to draw capital from other industries. Experience thus far offers inconclusive evidence; but it seems apparent that the family farm, transformed as it has already been to a considerable extent in the amount of land and necessary capital as well as in equipment and technic, will continue to remain the dominant type of farm-business organization.

Recent developments in farm machinery in the corn and livestock regions also have been conspicuous. There has been a very extensive substitution of tractors for horses as a source of power, and significant changes have taken place and are taking place in the introduction of higher-capacity planting, tilling, and harvesting machinery for corn and for the small-grain feed crops. Dependent as is this whole region on livestock as the end product and the direct source of income, it is an open question whether the wave of mechanization can ever have so important an influence upon the type of farming as it has already had in the small-grain region. To be sure, animal-husbandry practices have lent themselves to some mechanical devices that tend to eliminate or reduce labor requirements. Milking machines and cream separators have been introduced and improvements have been made in the facilities for feeding livestock and for marketing livestock products; but as yet the effect of these things in increasing the scale of operation has been generally less striking than has been the effect of machinery on crop production.

The recent drop in the prices of farm products has caused a marked slowing up in the adoption and use of farm machinery. Further development in mechanization must rest on such an improvement in the prices of agricultural commodities as will justify the considerable capital outlay necessary. The present period seems to be a repetition of recent history. The period between 1870 and 1900, as already indicated, was one of rapid agricultural development in this country. Farm machinery was not the least among the elements that stimulated this rapid development. As is always likely in such circumstances, the

development went too far and helped to bring about a depression in agriculture.

We have usually conceived such a condition of maladjustment to be remedied by a redistribution of population and capital between agriculture and the other industries. That such a readjustment process was actually under way during the last decade is indicated by statistics on the movement of population to and from agriculture. Up to 1931, every year since 1924 witnessed a net movement out of agriculture into urban pursuits. Undoubtedly this movement was going on before 1924; but except for 1922, which showed the same movement, figures are not available. This net movement from farms averaged during the seven years, 1924-1930, about 640,500 persons annually. But, in 1930, this net movement from farms greatly declined. After allowing for deaths and births on farms, there was a net gain in farm population during 1930 for the first time in many years. This net gain amounted to 208,000 as compared with a net loss in 1929 of 269,000. Unemployment in industry is even less attractive than low returns in farming, and it seems obvious that further readjustment in our agricultural output through reduction in the number of farm families will have to await a substantial recovery in industry and trade.

This, in turn, has its inevitable effect upon the further mechanization of agriculture and the rate at which it can proceed. As long as human labor is superabundant and therefore cheap, no very rapid substitution of machinery for labor can take place. Further, the costs of employing machinery seem to have a significance different from that of costs involved in employing proprietor and family labor upon the farm. Machinery costs must, for the most part, be met with fairly immediate cash payments which must come from the gross value of the product of farm operations. On the other hand, family and farmer labor costs are not always met to their full nominal value from the product produced, and failure of the farm business to return such values does not usually result in bankruptcy nor in the immediate abandonment of the farm.

The present situation with reference to farm mechanization and its relation to types of farming may be summarized somewhat as follows: The developments in mechanical sources of power and in implements and machinery to accompany them have, during the last 15 years, greatly increased the purely physical efficiency of human labor in the production of farm commodities. As long as favorable prices for these commodities could be secured this physical efficiency was reflected in economic efficiency and higher profits, and worked to displace considerable human labor, to increase the size of the operating unit, and to expand the output. These very developments, however, have helped to reduce the prices of commodities, and thereby to reduce the economic efficiency and hence the profits of farm operation under present conditions. It would seem that eventually not merely the present technic but one characterized by a considerably higher degree of mechanization will probably prevail. This development, however, must await very thorough-going economic adjustments, not only at home but abroad, before the prices of farm products can be such as to stimulate again a rate of growth in the use of farm machinery comparable with that which prevailed in the 10 years immediately following the World War.

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*Bureau of Agricultural Economics.*

## MECHANIZATION AFFECTS BOTH SUPPLY OF AND DEMAND FOR AGRICULTURE'S PRODUCTS

Within the last decade, the marked increase in the use of large-scale farm machinery and mechanized power has had an important influence upon the agricultural price system. The general effect of this movement toward mechanization has been to increase the production per farm laborer, to lower the price per unit of farm produce, and to transfer labor from the farm to the mine, the machine shop, the transportation system, and the sales force—a transfer that helped to cause the 11.5 per cent decrease in our farm population between 1920 and 1931.

The first important influence of mechanization has been to increase agricultural production. For example, the introduction of the combine and the increase in the use of the tractor in wheat production have resulted in a 65 to 85 per cent reduction in the amount of direct labor required per acre in wheat production on some of our level, semiarid land; in an increase in the cash expense per farm; and in an increase in the size of the farm unit that the individual wheat producer can handle.

This, in turn, has meant some reduction in the margin between the cash expense and income per farm, provided the amount of wheat sold remained unchanged. The wheat farmer, therefore, has been inclined to increase the size of his farm in order to secure a more efficient utilization of his machine equipment and in order to increase his farm income. Large-scale wheat production by the machine method, however, has tended to be a cheaper production method than the old direct-labor method.

As a direct result, wheat production in areas suited to mechanization was quite profitable up until the 1930-31 season. Because of this, wheat acreage has tended to increase from year to year in the level, semiarid areas in the United States, Canada, Argentina, and Australia. The result, as shown in Figure 157, has been a 25 per cent increase in the

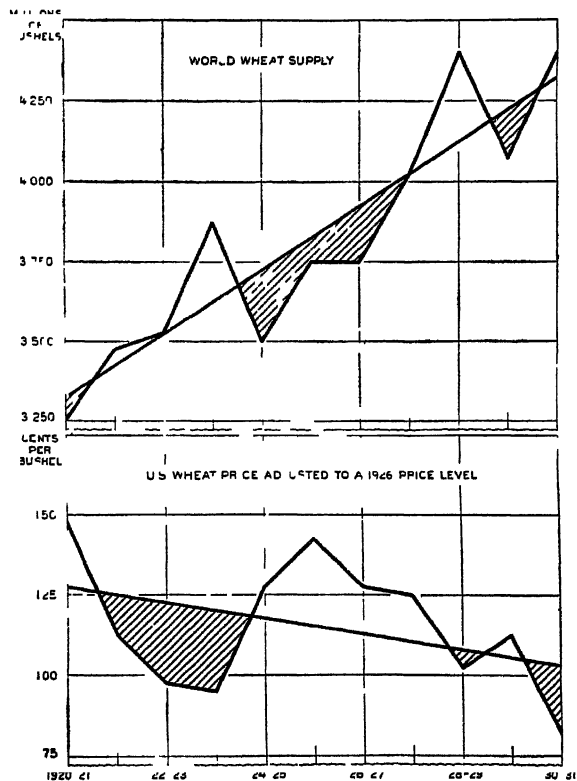


FIGURE 157—When the world wheat supply and the average farm price of wheat in the United States from 1920-21 through 1930-31 are compared, the supply-price relationship is quite clearly indicated. When the wheat supply has been above the trend line, prices have been below average and when the supply has been below trend, prices have been above average.

world wheat supply since 1921-22; and even though the world demand for wheat has apparently been increasing from year to year, United States wheat prices, when adjusted for changes in the general price level, still show a downward trend from 1920-21 through 1930-31.

In contrast to this first important influence of mechanization, that increases production and depresses prices, there is a second important influence that transforms the type of power used in agriculture and decreases prices by decreasing the farm demand for farm produce.

The increasing substitution of multiple-row for 1-row implements and the substitution of the tractor and the motor truck for the horse and mule have decreased the number of horses and mules required in American agriculture. This combined effect of improved machinery and mechanized power has resulted in a 29 per cent decrease in the number of horses and mules on farms in the United States between 1920 and 1931.

This decrease in the number of horses and mules in turn means an increase in the demand for raw materials and industrial labor and a decrease in the demand for pasture, hay, and grain. But just as an in-

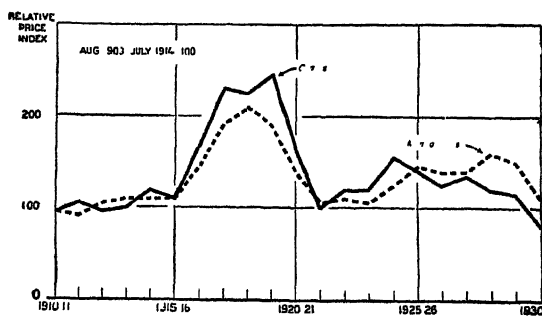


FIGURE 154 — Although the prices of grains rose higher during the war period than did the prices of meat animals, the prices of the two groups of commodities tend to move together, with meat animal prices changing from 6 to 15 months after grain prices have changed

creased production is accompanied by a lowered price level, so is a decreased demand.

The third important influence of mechanization is a result of the first two. When the production of certain farm products is increased and the price is driven down, the high-cost producer is inclined to readjust by cutting acreage. Again, when

the demand for a given farm commodity is decreased and the price is driven down, the high-cost producer is forced to cut production.

Mechanization in agriculture, then, may be an important factor in concentrating the production of given commodities in the areas that possess the highest comparative advantage or are best suited to the crop under consideration. Since 1920, this process has been illustrated by the increasing concentration of hog production in the Corn Belt and of wheat in the Great Plains area.

In the case of the typical field crop, the effect of mechanization has tended to be direct. In the case of wheat, production costs have been decreased, production increased, prices decreased or prevented from increasing, and the acreage readjusted on the new cost basis. In the case of corn, both the production costs and the demand have been decreased and prices have been depressed. Again, in the case of horse and mule prices, the effect has been direct—demand has been decreased and prices have been depressed.

#### Indirect Effect on Livestock Industries

In the case of meat animals and dairy and poultry products, however, the effect of mechanization has been indirect. To begin with, the

price of the farm-raised hay and feed grains is affected by mechanization. But since the feed cost is the most important cost element in livestock production, changes in the price of farm-raised feeds, as indicated in Figure 158, soon tend to be transferred in part to livestock prices.

We may conclude that mechanization is an important influence behind the price of certain agricultural commodities, which, through the last decade, has tended to increase production enough to offset the increase that might have been expected in the agricultural price level had agricultural production remained unchanged while the population of the United States and of the world continued to increase.

This influence, in turn, has been exerted: (1) By decreasing production costs and increasing production, (2) by decreasing the farm demand for certain agricultural commodities and thus increasing the net productive acreage, and (3) by concentrating the production of certain agricultural commodities in the regions best suited to their production and thus still further decreasing costs.

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## MECHANIZATION HAS MADE GREATEST PROGRESS IN THE GREAT PLAINS REGION

Perhaps in no other agricultural region of the United States has there been a more fertile field for the mechanization of agriculture than in the Great Plains—that vast expanse of country extending from the Panhandles of Texas and Oklahoma to North Dakota and Montana. This region, all lying within a range of 13 degrees of longitude, is characterized by wide extremes of temperature, low rainfall, high winds, a loose loam soil, and comparatively large stretches of level land; all of which have contributed to an agriculture that has grown and thriven on mechanical power.

At first the home of the Indian and the buffalo, then of the Texas steer which followed the Chisholm Trail, this region has been open to settlement for about half a century. Though it was first homesteaded in half-section units or less, the passing years have witnessed a consolidation of these small units until to-day single farms embracing thousands of acres are not uncommon. Varied as the sections from which came the settlers, were the horse-drawn implements that they brought with them to subdue the wild prairie sod. There followed years of experience, development, and trial before suitable equipment that would function most efficiently under Great Plains conditions was available.

During the agricultural infancy of this region changes in the methods and machines of production and in the strains of crops grown took place as the new settlers became accustomed to the peculiarities of their new surroundings. Horses and mules, before 1910, were about the only source of motive power available and the daily capacity of individual workers was dependent upon the size of these teams and the implements they pulled. With the available power and equipment at his command the agricultural worker in the winter-wheat belt of the Great Plains could handle without help, except during the peak-load periods of wheat seeding and harvest, an average of about 320 acres of crop land, 200 to 220 acres of which was in wheat and the

balance in feed crops. In the spring-wheat belt the same total acreage could be handled with 160 acres in wheat, 40 in summer fallow, and the balance in feed crops.

### Horses and Mules Largely Supplanted

Rapid changes in farm power began taking place after 1910 and were augmented by the stimulus to agriculture resulting from the World War. Horses and mules were supplemented by mechanical power in the form of tractors, trucks, and automobiles. Tractor figures by States are not available for the early years. As a source of farm power, however, the tractors were relatively unimportant in 1909, the first year in which figures on the number manufactured were available. In that year 2,000 were manufactured in the United States. In 1919 the United States census reported a total of about 82,000 tractors on farms in the eight important wheat-growing States of the Great Plains. Of these States, Kansas led with a total of 17,000 machines. Colorado, with about 5,000, had the fewest. Tractors of this decade were mostly of the large, slow-moving type, crude in construction and costly in operation. Trucks and automobiles were of little importance as a means of transportation in 1909, when about 3,000 of the former and 122,000 of the latter were manufactured. By 1919, there were about 27,000 trucks and over 500,000 automobiles on Great Plains farms. That these machines were exerting an influence on power usage is indicated by the fact that during this period, while the total number of horses and mules increased nearly 8 per cent on the farms of this region and this increase was accompanied by a 51 per cent increase in wheat acreage, there was a decrease in number per 100 crop acres of from 6.2 to 5.3 head. It was about the end of this decade that small tractors pulling 2 and 3 bottom plows were introduced, and that they were immediately popular is partly evidenced by the fact that the number of tractors manufactured in 1917 and 1918 was about 100 per cent greater than in each preceding year.

During the next 10-year period rapid mechanization took place and the number of tractors on Great Plains farms increased from about 82,000 in 1919 to 274,000 in 1929, trucks from about 27,000 to 100,000, and automobiles from about 500,000 to 1,000,000. Kansas, which led in number of tractors in 1919, was still leading in 1929 with a total of 66,000, an increase of nearly 300 per cent; whereas Colorado, still following the other States, showed about 200 per cent increase. Wheat acreages, as in the past decade, again increased and in 1929 were 15 per cent higher than in 1919. Horses and mules, however, showed a decline of approximately 13 per cent in total numbers and from 5.3 to 3.6 head per 100 crop acres.

The increasing and widespread use of tractors and the power equipment necessary for their most efficient operation, together with trucks, has been reflected by radically changing machinery values per crop acre. For the year 1909 machinery values per crop acre for the Great Plains averaged only \$3. This value represents equipment practically all of which was horse drawn. By 1919, not only because of more machinery but because of a high general price level, values had risen to \$7, an increase of 133 per cent, on a crop acreage 26 per cent greater than that of 1909. Because of more efficient tractors and larger equipment as well as some decline in prices, 1929 values per crop acre on an

acreage 30 per cent greater averaged \$1 lower than those of 10 years previous.

### The Combined Harvester-Thresher

Expanding wheat acreages, increases in machinery values, and declines in numbers of work stock, although caused primarily by mechanical power, have been influenced to a very marked degree by power equipment. Perhaps the chief influencing factor of equipment is the combined harvester-thresher. This machine, first used in the wheat-growing districts of the Pacific coast many years ago, is comparatively a newcomer in the Great Plains. Some 20 years ago a few machines were brought into the Judith Basin of Montana where they proved successful. One or two were carried as far south as Nebraska, but their usefulness there was short-lived. The first small combine was manufactured early in the present century, and its use and life in the Intermountain and Pacific Northwest States were also rather short. The first small prairie-type combine, 10 to 20 feet in size with a capacity of about 30 to 50 acres per day and equipped with an auxiliary motor, was introduced into the Great Plains in 1918. This machine in the years that followed proved to be practical, efficient, and economical under most conditions in that region. From a few machines in 1918, Kansas in 1926 had an estimated total of about 8,300 combines which cut 30 per cent of the wheat crop that year. It was estimated there were about 20,000 combines on Kansas farms for the harvest of 1931. Other Great Plains States have no doubt shown proportionate increases in numbers of combines on wheat farms in view of the fact that in the period 1927 to 1930, nearly 66,000 combines were sold in the United States.

In the winter-wheat area, the disk harrow-plow with a daily capacity of 25 to 30 acres, is replacing other implements in preparing the land for planting. In the spring-wheat area where summer fallowing is necessary, the duck-foot cultivator has partly eliminated plowing. Mechanical power in conjunction with these and other machines has so lowered production requirements that former submarginal lands once considered good only for grazing are now producing wheat that, under normal prices, returns a profit on labor and materials of production.

An examination of the effects of mechanization on labor requirements shows clearly why the trend has been toward modern units of power and equipment. Investigations made in Montana, for example, indicate that where 35,000 wheat farmers were operating in 1915 to 1917, there were only 14,000 in 1929 and they in turn were handling a larger acreage. Man-labor requirements that, under the old system, amounted to from 10 to 14 hours per acre have been reduced to from 2 to 3 man-hours per acre under present conditions. Records from individual farms show that with horses it is possible for one man with some help at harvest time to handle 320 acres of crop land. With the old heavy-type tractor 700 acres per man could be handled; substituting a lighter modern 3-plow machine, 1,000 acres; and with a modern heavy-duty tractor of 30 draw-bar horsepower, 1,600 acres. Investigations made on a number of farms in Kansas show an average man-labor requirement of 6.6 hours, for producing an acre of winter wheat entirely with horses under the old methods, whereas on farms operated entirely with mechanical power and using a 20-foot combine, only 1.34 man-hours are necessary.

### Production Methods Immensely Changed

It is clearly evident that mechanical power and equipment are forces that in the operator's hands have allowed him completely to change his methods and practices of production. In the rapidly moving picture of agricultural changes and adjustments, the effect of mechanization on the society of the community perhaps has been obscured by the stupendousness of machine production and the wonder with which it is viewed. By enabling one man to handle an acreage several times that formerly handled with horses, mechanization has led to the consolidation of farms and to a reduction in farm population as evidenced by the changes in the numbers of wheat farmers in Montana where there has been a decline of 60 per cent together with a slight increase in total crop acreage handled by those remaining, who procured the additional land through purchase from less aggressive neighbors, and by purchase or lease of abandoned or State land.

In many communities mechanization has led to what may be termed a semiabsentee-operator system of wheat farming. Under this system the operator is on the farm or in the community only long enough to put in and harvest the crop. It is the present custom of many farmers immediately after harvest to move with their families to large towns where school and social advantages are on a higher plane than in their own community or neighboring towns. Others spend the winter in the warm climates of Florida or California. It is not infrequent to find farms to which the operator comes only in the spring and fall, leaving his family in some distant town or city. Under such a system, together with a decreased farm population, many of the small prairie towns dependent on farm trade for their existence can not survive. It may be argued that they are not a necessary adjunct, for with the automobile or truck the distant large town is quickly available for immediate wants. The majority of large towns in agricultural sections, however, are just as dependent on farm trade, and they too must shrink to a size that can be maintained by a smaller rural population, part of which supports the community for only a fraction of the year.

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### CORN BELT INCREASING ITS OUTPUT PER MAN IN ALL PHASES OF CROP GROWING

The Corn Belt of the United States includes territory naturally well suited to the development of farm mechanization. This is due to the fortunate combination of gentle topography, fertile soils, and a climate favorable to a number of crops. Moreover, in this region a large proportion of the farms are over 100 acres in size. However, in so far as sections of the Corn Belt are dependent upon livestock as their end product and the direct source of income, they will never be open to mechanization to quite the same extent as are regions given over to small-grain production alone.

#### Increase of Accomplishment per Man

According to studies of farm organization in the Corn Belt, the recent addition of mechanical power has raised the accomplishment per man

per day in the case of every operation studied. Thus, plowing with five horses 4.5 acres per day compares with 7 acres plowed with a 2-plow tractor and 11 acres plowed with a 3-plow unit.

Similarly, the accomplishment per man in double disking is raised from 14.5 to 21.5 and 30 acres, respectively, while plank dragging with five horses covering 20 acres per day becomes 37.5 acres when done with the tractor. In like fashion, cultipacker, harrow, and rotary hoe, each drawn by four horses and covering 16.5, 24, and 22 acres, respectively, cover 23, 43, and 31 acres when tractor drawn.

Planting corn, until recently a task delegated to the fast-walking team of the farm and averaging in the above mentioned studies but 14 acres per day, was, through the use of the 4-row power planter, speeded up to 33 acres. In the cultivation of corn the use of cultivators of the 4-row type, usually tractor operated, has raised the accomplishment per man to 40 acres per day from the former 6 to 8 acres for single row and 12 to 14 acres per day for 2-row, animal-drawn implements.

Another important stride in the mechanization of corn growing is the perfecting of the mechanical corn picker. Where two hand huskers under farm conditions were reported as husking 2.8 acres per day, two men and a 1-row picker husked 6.7 acres whereas two men and a 2-row machine harvested 10 acres. In corn yielding 50 bushels per acre, this represented 70, 167.5, and 250 bushels per man per day, respectively.

The entire operation of growing corn, often consuming 15 hours of man labor per acre under the older methods, has been performed on many farms with but 7 to 8 hours of man labor when these advanced stages of mechanization are introduced. Individual instances show even more striking differences.

### Small Grains in the Corn Belt

In like manner these recent changes in mechanization have been adopted on Corn Belt farms in the operations incident to the culture of small grains and forages. This is strikingly seen in the seeding of oats and wheat in which, depending upon the particular combination of operations employed upon different farms, from 37 to 74 per cent of the power application was supplied by the tractor. On the same farms approximately 60 per cent of the work on soybeans was done by tractor power. In harvesting and threshing oats a crew of 17 men using stationary grain separators for threshing, applied 5.6 man-hours per acre whereas with a combined harvester-thresher a crew of 3 men used but 1.3 hours. For wheat the figures were 16 men and 6.1 hours per acre compared to 3 men and 1.3 hours, respectively.

An item worthy of note in this connection is the increase in crop acres per worker between 1909 and 1929. Based upon figures taken from the Federal census the Corn Belt States reported increases in crop acres per worker of from 15 to 37 per cent; although obviously this increase is not to be credited entirely to mechanization.

Horse and mule numbers on farms in the United States declined from 21,217,000 in 1910 to 17,611,000 in 1930, a decline of 17 per cent. For the Corn Belt States these numbers have likewise decreased, the decline from 1910 to 1930 being 22.5 per cent in Iowa and 36 per cent in Illinois. This decline is in part due to the introduction of the automobile, the truck, and the tractor, but is also due in part to other changes in farm technic aside from the introduction of mechanical

power. More significant perhaps is the accompanying decrease in the number of horses used per 100 acres of crops. In every State of the Corn Belt this figure has declined, the figure of 6.5 horses per 100 acres of crops in Iowa in 1910 becoming 4.6 in 1930, whereas for Illinois the figures are 6.8 and 4.2 respectively. Michigan with less opportunity for mechanization shows a decline from 6.6 to 4.1 and Missouri from 8.1 to 5.3.

### Change in Size of Farms

Increasing mechanization on individual farms, by reducing the demand for man labor upon a given acreage, may result in hiring less outside labor. Given a fixed labor force, or one that is reduced with difficulty, the result may be the combination of several farms into one. Usually, however, mechanization results in the addition of odd tracts of land to the area already included in the operation of the farm.

Studies in specific regions show that a few farms have been combined and some farms have been enlarged probably as a result of the greater accomplishment per man growing out of increased mechanization. Despite this evidence, however, the trend to combine or enlarge farms is but dimly discernible in the published census figures for the United States. This is in part due to the increase in the number of small farms near cities, offsetting the increase in the size of the larger farms. Individual States in the Corn Belt show this tendency toward larger-sized units with somewhat greater definiteness. When counties in the major corn-growing regions are studied in detail a tendency toward increase in the size of farms over 100 acres appears. This tendency is as yet insufficiently marked to be considered a definite trend.

Farms under 100 acres show but slight opportunity to adopt the more complete phases of mechanization. At present farms under 100 acres represent from 28 per cent of the total number of farms in Iowa to 60 per cent of the total number of farms in Michigan; this variation depending upon local conditions. Whether these small farms will be eliminated in the future is a matter of conjecture. Some of them probably will always have a place because of peculiar conditions of the local market and the nature of the land, or the particular tenure conditions prevailing.

### Extent of Mechanization

Satisfactory data are lacking to depict for local regions the extent to which the more recently developed forms of mechanization have been adopted by American farmers. For the United States as a whole a large relative increase in tractors has taken place. As noted in a previous article, in 1909, 2,000 tractors were manufactured in the United States. For 1930, the Federal census reports 920,000 tractors on farms. Illinois alone reports almost 70,000, Iowa 66,000, Ohio 53,000, and other States smaller but still significant numbers. Similarly, tractor-drawn cultivators of which 1,698 were sold in the United States in 1925 increased to 41,577 in 1930, whereas mechanical corn pickers, of which 7,145 were sold in 1927, were reported as being sold to the number of 9,871 in 1930. The combined harvester-threshers, a number of which are being used in the grainfields of the Corn Belt, have increased from 1,590 sold in the United States in 1924 to 17,031 sold in 1930.

Despite these large relative increases in numbers there is but one tractor to each seven farms in the United States. In the Corn Belt States the numbers are larger, being one tractor to three farms in the States of maximum corn production such as Iowa and Illinois, but decreasing to one tractor to four farms in Indiana and Ohio, and to but one tractor to five farms in Michigan and one tractor to 10 farms in Missouri. Upon the number of tractor-cultivators sold in the United States from 1925 through 1930 it is estimated that an average of probably only one tractor-cultivator to 10 farms over 100 acres in size is to be found in the Corn Belt. On a similar basis there is estimated to be one corn picker to every 10 farms over 100 acres in size.

That the advanced stages of mechanization are less applicable to small farms is demonstrated by studies of the organization of farms in a good corn-growing section of the Corn Belt. Here, farmers with less than 35 acres of corn performed with the tractor only 11 per cent of the work; those growing from 35 to 70 acres of corn used the tractor up to 35 per cent; and those growing over 70 acres of corn used the tractor up to 45 per cent. In this same section in 1929, on 116 farms, 75 per cent of the corn was husked from the standing stalks and of this amount 70 per cent was husked by hand, 27 per cent by 1-row pickers, and but 3 per cent by 2-row machines. These proportions have changed somewhat in favor of machine huskers in 1930 and 1931 and may be low for other portions of the Corn Belt, but are still effective evidence of the limited acceptance of the advanced stages of mechanization.

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## MECHANIZATION IN DAIRY REGIONS INCREASING FAST, INVESTMENT DATA SHOW

The dairy region has a comparatively short growing season and lacks the large level fields that characterize the corn and wheat regions of the United States. Hence machinery and mechanical power for field work are not used here to the extent that they are used in the other regions. On the other hand, milk is a bulky product, and on a large proportion of the farms it must be hauled daily. This has led to a greater use of trucks than of tractors on dairy farms. Thus the State of New York, according to the 1930 census, had 37 trucks and 25 tractors per 100 farms, whereas Illinois had 19 trucks and 32 tractors per 100 farms.

The work of caring for the dairy herd requires more than 50 per cent of the total farm labor on the specialized dairy farms in the northeastern United States. Approximately one-half of the work on the dairy herd is taken up in milking where hand milking is practiced. This one operation under hand milking usually limits to 10 or 12 the number of cows that can be kept per worker. Few dairy farms reach the upper limit in numbers of cows to be milked per person with a milking machine. Cases of one man milking 30 cows or two men milking 60 cows are not unusual.

The number of milking machines on farms is not recorded in the census of agriculture but an indication of their numbers on dairy farms can be obtained from various farm surveys that have been made.

In the spring of 1930 the New Hampshire College of Agriculture made a survey of 414 farms in Grafton County. Ninety-six of these farms had milking machines. A year later a survey made in Coos County showed that 42 dairy farms out of 83 had milking machines. In Connecticut the extension service obtained reports from 863 dairy farms of which 298 had milking machines. A survey of 318 farms in northeastern New Jersey in the winter of 1930-31 showed milking machines on 75. In southeastern Pennsylvania (Chester County) a survey of 204 farms in the summer of 1931 showed 21 owning milking machines.

The total investment in farm machinery per farm in the New England States increased 173 per cent from 1910 to 1930. In Wisconsin the increase amounted to 213 per cent per farm for the same period. Part of this increase was due to a rise of about 50 per cent in the price level. Mainly, however, the increase was due to the addition of trucks, tractors, automobiles, and milking machines on many farms, and to a less extent to the addition of new field machinery such as side-delivery rakes, hay loaders, corn binders, etc.

#### Changes Partly Attributable to Mechanization

The changes that have taken place in the dairy region during the last 20 years have been due in part to mechanization. The available measures of changes in size, efficiency, and productiveness do not measure the effect of any one factor alone, but rather are the result of a number of factors. Thus the number of dairy cows per farm in the New England States in 1930 was 26 per cent above the number per farm in 1910, and the milk production per farm for 1929 was 57 per cent above the production in 1909. It seems reasonable to assume that a part of the increase in numbers of cows during this period was due to better barn equipment and to milking machines. But the increase in milk production per farm over and above that due to the increase in numbers of cows was more likely due to better cows, and to better feeding and care of them.

Definite information on the saving of labor per cow associated with the use of milking machines was obtained in the Grafton County, N. H., survey in 1930 previously referred to. During the year the 96 farms with milking machines spent 130 hours of man labor per cow or three-fourths as much time as was spent per cow on the 230 farms that did not have milking machines. The former group had 22.8 cows per farm compared with 14.8 in the latter group.

Similar results were obtained in a survey made in the summer of 1931 covering parts of the New England States and Wisconsin. The 26 farms with milking machines used 71 per cent as much man labor per cow as did the 41 farms that did not use milking machines. The average number of cows per herd were 26 and 17.7, respectively.

This difference in size of herds would account for some of the difference in the labor required per cow. On the other hand many of the farms using milking machines have not yet adjusted the size of their herds and other factors to the new equipment so as to attain the same relative efficiency that is attained on the farms where milking is still done by hand.

Another measure that gives some indication of the effect of mechanization is the number of crop acres per farm worker. From 1909 to

1929 the number of crop acres per farm worker increased in nearly all of the dairy States. In Vermont the increase was from 26 crop acres per worker in 1909 to 30 crop acres per worker in 1929. For New York the comparable figures were 25 and 31, and for Wisconsin 31 and 36

### Labor Efficiency Study in Connecticut

A study of labor efficiency in Connecticut reported in Connecticut Agriculture Experiment Station Bulletin 172, corroborates the assumption that some of these increases were due to mechanization. Detailed records of the man labor used in haying on 115 farms showed that the 17 farms using hay loaders spent 0.65 hour less man labor per ton of hay than the farms that had no hay loaders.

A test was made of silo filling on 3 farms on which corn binders, low racks, a medium-sized cutter, plenty of power, and a well-organized crew were used in comparison with the average of 40 farms that lacked some of these essentials. These 3 farms filled their silos with 40 per cent of the man labor per ton that was used on the average of the 40 farms. Approximately the same results are reported in an earlier study in New Hampshire.

As yet mechanical refrigerators for cooling milk are seldom found on the farms, but cleaner milking, the use of more sanitary barn equipment, more ice in cooling, covered cans, tank trucks or tank cars for hauling, good roads, pasteurization and cooling at the city plants, and prompt delivery to the consumers have brought about a steady improvement in the quality of milk. Consumers have increased the quantities used per person even when the price as compared with that of other foods was increasing. Similar improvements have been made in methods and equipment for producing, handling, and transporting other dairy products. Thus we see that from the production of feed on the farm to the delivery of dairy products to the consumer, mechanization has become increasingly important.

Within the general dairy region are small areas that specialize in the production of potatoes, truck crops, and fruits. On some of the potato farms mechanization has gone practically as far as on the specialized wheat farms in the West. In Middlesex and Monmouth Counties, N. J., more than 30 potato farms, within the last two years, have done practically all of their field work with general-purpose tractors, and their hauling with trucks. Vegetables and fruits are still harvested mostly by hand but tillage operations are being performed more and more by large tractor-drawn implements. A study is now being conducted in the potato and truck areas of New Jersey to determine the conditions under which increased mechanization is profitable.

In the preparation of fruits and vegetables for the market, various homemade devices are used on the small and medium sized farms to lessen hand labor. Studies in Massachusetts of the time required in preparing vegetables for market indicate that some of these homemade devices are highly efficient. Large farms and cooperative packing plants use more elaborate and more standardized equipment.

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## MACHINERY IS THE BEST MEANS YET FOUND FOR CONTROLLING CORN BORER

At the present time, control of the European corn borer is best accomplished through the use of machinery. However, because of cer-

tain habits of the borer it can not as yet be successfully combated in the growing crop, but must be attacked during or after harvest. For the application of mechanical control two general field conditions have to be met: (1) Disposal in the field of the standing stalks from which the corn has been

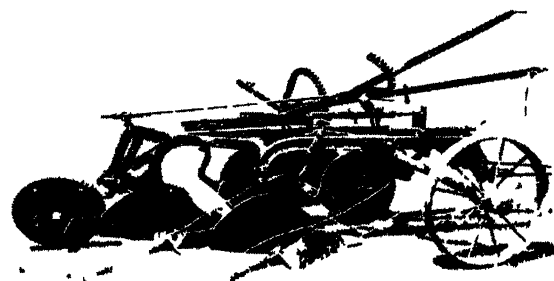


FIGURE 159—Two-bottom plow with attachments for clean plowing—large rolling colters, jointers, and trash wires

hand or machine picked, and (2) removal of the whole stalks, with the contained borers, from the field for later disposal—as in silage or by mechanical husking and shredding.

On probably 80 per cent of the corn acreage in the Corn Belt States the corn is picked from the standing stalks. Of this area approximately one-half is plowed and the balance ordinarily is disked down and then seeded to small grain, or it is poled, raked, and burned preparatory to being seeded to small grain.

To effectively control the corn borer the plowing must be done in such a way that all stalks and crop refuse are completely covered to a depth of 6 to 8 inches so that subsequent seeding and tillage operations or weathering will cause little, if any, of the buried trash to reappear. Because of this elimination of their shelter, the borers coming

to the surface die from exposure or from attacks of natural enemies.

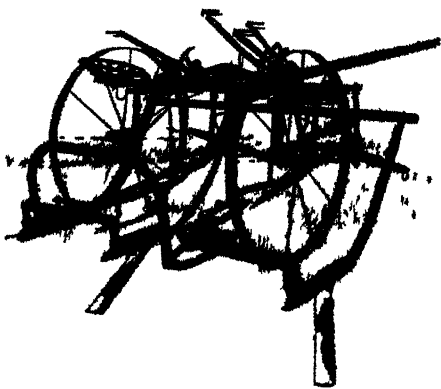


FIGURE 160—Stalk-shaving attachment on single row cultivator, adapted for cutting three rows at one time

### Adjustment for Clean Plowing

To plow clean the implement must be properly hitched and adjusted so that it runs level, making furrows of uniform depths and widths. By the use of special attachments such as trash wires, large colters and jointers, clean coverage is greatly facilitated. Figure 159 shows a plow fitted with special attachments. Fourteen-inch plows give fair

coverage, but 16 and 18 inch, in most cases, give better coverage. It has been found that careless adjustment has a greater relative effect on the performance of a small plow than on that of a large plow.

Where the stalk fields are to be seeded to small grain the treatment of the crop *débris* for borer destruction is important. Disking only, before seeding, results in killing only a negligible percentage of the borers. By the ordinary processes of poling, raking, and burning, not enough borers are destroyed to effectively control the pest. Field tests have indicated that for satisfactory poling a temperature below 20° F., high moisture content of stalk, and freedom from snow are essential. Observations at Toledo, Ohio, extending over four years, showed these conditions existed on only one or two days each winter. Even under the best conditions all stalks were not severed and clean

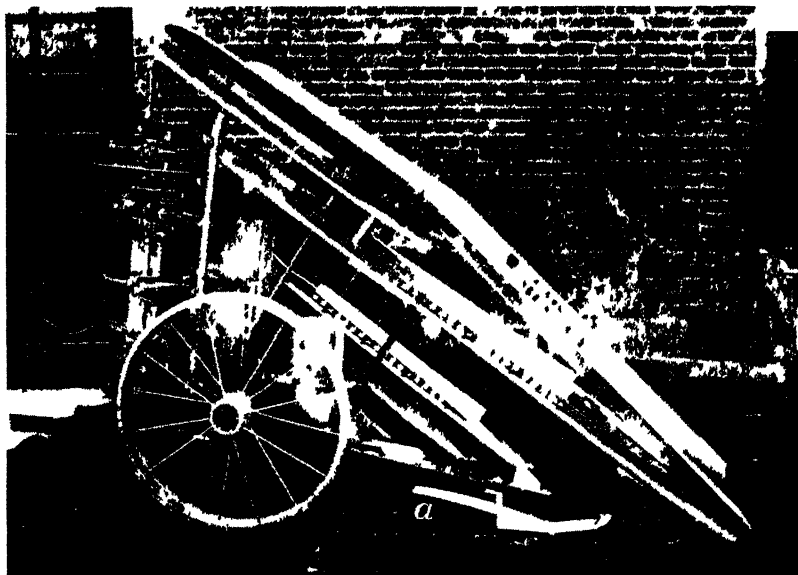


FIGURE 161—Low cutting attachment on corn binder. With the curved stationary knife (a) for cutting the stalks at ground surface, it is necessary to use also a sickle guard and special springs and guides to hold the stalks.

raking was difficult if not impossible. Moreover, the stalks were considerably shattered and the borers thereby scattered about.

By the use of a 2-row sled stalk shaver or a single-row cultivator with a 3-row stalk shaving attachment (fig 160), practically all stalks may be detached flush with the ground surface. With two sled shavers abreast, four rows may be cut at one time. The attachment for cutting three rows has been adapted to six of the commonly used single-row cultivators. For cutting four rows, a 4-row attachment has been made for two common makes of 2-row cultivators. Attachments for 3 and 4 row cultivators are in process of development.

#### Clean Raking Necessary

After the stalks are detached, clean raking in piles or windrows is necessary. This is best accomplished by the special 4-bar side rake, although the dump rake followed by the ordinary hay side rake will

do a fairly satisfactory job. Burning then follows, during which operation care should be taken that all stalks and bits of debris are consumed by the flames.

In harvesting, if the stalks are cut flush with the ground surface, most of the borers may be removed from the field in the stalks. The ordinary corn binder leaves stubble at least 5 inches long. By the use of a binder equipped with the stationary-knife, low-cutting attachment, the stalks may be cut at the ground surface. (Fig. 161.) For surface cutting by hand a special corn-harvesting hoe may be used.

After the corn is removed from the field, careful ensiling results in practically complete borer destruction, as does also mechanical husking and shredding. Borers which escape the knives of the silage cutter perish in the silo. Those that are not killed in the husker-shredder die from exposure or from being trampled in the yard.

The foregoing applies particularly to the 1-generation area, or north-central infestation. With some modifications, chiefly as to plowing and the low-cutting of the corn, the measures are applicable to the 2-generation or New England infestation.

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## MECHANIZATION IN SOUTH HAS BEEN RETARDED BY LACK OF A COTTON-PICKING MACHINE

Below the Mason and Dixon line, in the old Cotton Belt, the use of mechanical power and equipment has lagged, when compared with its use in other farming regions. This is not because the southern planter is more conservative, more satisfied to carry on after the fashion of his fathers, less progressive than his neighbor in the newer cotton regions of Texas and Oklahoma, or less eager for efficient methods of production, than are farmers in the Wheat and Corn Belts; but because of peculiar circumstances that have, at any rate until now, generally counterbalanced much of the effectiveness of the larger units of machinery.

Where farm machinery has proved its economic value in the South it has been adopted rapidly and generally. Thus in the Cotton Belt of western Texas and Oklahoma, where itinerant labor is available for chopping and picking, and where the size of farm and the topography are generally well suited to the use of large machines, mechanization to a considerable degree has been adopted for handling cotton, grain sorghums, truck, and small grains, which are the principal crops grown. A survey of the rice area of Arkansas shows that there is not a single rice farm without tractor power. Even the most highly mechanized sections of the Wheat Belt are not generally so completely stocked with machine power.

In contrast to the general use of power machinery by rice growers, the cane growers of Louisiana have been cautious about replacing their mules with tractors. Of 74 cane farms studied in 1929 only 8 were using tractor power. Others contemplated the use of tractors for the 1930 season. The cotton farmers in the hill sections of the South make a still smaller use of mechanical power and even in the Delta sections the mule remains the prime source of power.

### Factors Resistant to Mechanization

A number of factors contribute to this resistance to mechanization in much of the "Old South." The cropper system of tenure is based upon small farming units, and can operate only with them. So long as cotton is chopped and picked by hand, there is no advantage in conserving labor for other operations since the workers must be retained throughout the year so that they will be on hand for these very important and seasonal duties. To this difficulty is added the handicap in the shortage of available labor now trained in the use of mechanical devices. Over a great part of the Old South the farms are too small to warrant a heavy investment in mechanical equipment. Especially on the hill farms the fields are small and irregular in shape with a soil and topography that make terracing necessary to prevent erosion. In the wooded sections stumps in the fields often hinder the use of any except small mule-drawn implements.

Cotton, corn, rice, sugarcane, peaches, tobacco, and grain in various combinations make up a diversity of crops in the Southern States. Although tractors were in general use throughout other agricultural regions in this type of production, their adoption in the South was slow and it was not until a general-purpose tractor with specialized equipment was available that any real progress in mechanization in fruit and truck culture did take place.

Under conditions that have long existed, with mules as the only available source of motive power, the hill-section operator and his family can handle 25 to 40 acres of crops, and the plantation-cropper family about 15 acres of cotton plus a few acres of feed crops, whereas the west Texas operator alone, with larger equipment, takes care of 100 acres of crops, except during harvest. Although figures by States are not available, it is hardly probable that mechanical power in the form of tractors, trucks, and automobiles was an important factor in most of the South before the World War, or until the small tractor, pulling 2 and 3 bottom plows, was introduced about 1918. In 1919, the first year in which tractors were reported by the United States census, there were about 29,000 tractors on farms in the 10 cotton States as compared with more than 246,000 on all farms in the country. Of the total number in the Cotton Belt, about 9,000, or 31 per cent, were in Texas. Many of these were on farms that produced small grains, primarily wheat. During this same year, Mississippi could muster a total of only about 600; whereas the Corn Belt State of Illinois had 23,000 tractors on farms and the wheat State of Kansas had 17,000.

### Trucks and Autos in South

As the acreage of cotton that can be handled by one man is limited by the amount that he can chop and pick, the tractor of that period did not materially affect the cotton acreage handled per man. But, acreages of other crops handled per worker no doubt showed a slight increase. Trucks and automobiles were also of relatively little importance at that time and by 1919 there were in 10 Southern States only about 21,000 of the former and 367,000 of the latter, with Texas again leading in both, and Louisiana having the fewest. During the decade from 1909 to 1919 there was an increase of over 9 per cent in the total number of mules in the 10 States. There was, however, a 19 per cent

increase in crop acreage, which resulted in a decrease in mules per 100 crop acres from 6.8 to 6.3 head, indicating that mechanical motive power was beginning to exert some influence on southern agriculture.

From 1919 relatively rapid strides were made in mechanization in the cotton States as a whole, and by 1924 the number of tractors had increased from about 29,000 to 59,000; trucks from about 21,000 to 57,000; and automobiles from about 367,000 to 664,000. During the 5-year period, 1924 to 1929, tractors again increased markedly. This increase was due to several causes, chief of which was the introduction of the general-purpose tractor, together with planting and cultivating equipment. In 1929, according to the United States census, there were about 112,000 tractors, an increase of about 290 per cent in 10 years; trucks numbered 177,000, an increase of about 740 per cent; and automobiles 1,068,000, an increase of 190 per cent. In number of tractors, Texas again led. Mississippi, however, led on a percentage basis with an increase of about 730 per cent, whereas Louisiana had the lowest percentage increase. By 1929, Texas also led in total numbers of trucks and automobiles, with South Carolina having the fewest trucks and Louisiana the smallest number of automobiles. Mississippi showed the greatest percentage gain in trucks and automobiles from 1919 to 1929, with an increase of about 1,540 per cent for the former and 440 per cent for the latter. As in the preceding decade, crop acreage in the 10 States increased, and in 1929 was about 15 per cent higher than in 1919. Mules during the same period showed a decline of nearly 8 per cent in total numbers, or from 6.3 to 5.1 head per 100 crop acres.

### Multiple-Row Planters and Cultivators

In the early period of tractor usage, plows, listers, and disk harrows were about the only implements used for drawbar operations. With the development of the general-purpose tractor came the 2-row lister, and 2-row and 4-row planters and cultivators. The combine harvester-thresher, which has revolutionized harvesting and threshing operations in the Great Plains, has also invaded the Cotton Belt States. Figures showing the numbers of combines by States are not available, but it is known that as early as 1925 one combine was purchased and used in Mississippi. A study made in South Carolina in 1931 included 36 grain combines, 20 of which were bought that year. Georgia also has a considerable number, and one plantation in North Carolina had 5 combines in 1928.

With the increasing use of tractors, power equipment, trucks, and other machines, values of machinery per crop acre have changed materially. For the years 1899 and 1909, when all equipment was mule drawn, values amounted to only \$2 and \$3 per crop acre, respectively. By 1919, due not only to more machinery but to a high general price level, values had risen to \$6, an increase of 100 per cent over 1909, on a crop acreage 19 per cent greater. With more efficient tractors and equipment, with some decline in prices, and with an acreage 15 per cent greater than in 1919, values per crop acre in 1929 averaged \$1 lower than those of 1919.

While mechanical power in the South has been affecting numbers of mules, total acres in crops, and machinery values per acre, there has also been a noticeable effect on the capacity of individual workers. Comparisons between 1909 and 1929 show that in North Carolina the

acreage handled per worker increased from 13 to 16 acres; in South Carolina from 16 to 20; in Georgia, from 19 to 25; in Alabama, from 17 to 21; in Tennessee, from 16 to 22; in Mississippi, from 14 to 18; in Louisiana, from 15 to 19; and in Arkansas, from 16 to 23. In Oklahoma and Texas, where wheat as well as cotton is an important crop, acreage increases per worker between 1909 and 1929 were from 38 to 59 for the former State and from 25 to 46 for the latter. For the entire Cotton Belt the average crop acreage per worker increased from 19 to 28 acres, or 47 per cent.

In the Mississippi Delta cotton produced with mules required an average of 128 hours of man labor and 39.3 hours of mule work per acre, while that produced with tractors and some mule work required 90.8 hours of man labor, 5.5 hours of tractor and 5.3 hours of mule work.

### Mechanization Prospects in Cotton Belt

What is in store in the way of more efficient and widespread utilization of mechanical power in the Cotton Belt? Eli Whitney's invention of the cotton gin was to the cotton planter what the invention of the threshing machine was to the grain grower; but the grain binder or combine harvester-thresher has no counterpart in cotton-harvesting machines and this one fact alone affects the entire future structure of mechanization for the production of cotton. As previously stated, the acreage of cotton that one man can handle is usually limited to the amount that he can chop and pick. By using a hill-drop planter, hand chopping and hoeing can be largely eliminated, but the picking is still to be done by hand; so the situation in much of the cotton country remains static. Without a successful cotton-picking machine, the planters in many sections are faced with the necessity of maintaining throughout the year a labor force sufficient to pick the crop, and extensive mechanization would result in piling up many idle hours for the croppers waiting for harvest time. The sugarcane planter finds himself in much the same position as the cotton grower. Planting and harvesting are still done by hand because of a lack of suitable equipment.

At present there are a number of cotton-picking machines which, according to unbiased observers, are nearing the stage of development bordering on success. In the last few years there have been developed machines for planting and harvesting cane which, according to reports, have possibilities of success. The next few years should witness the success or failure of the cotton and cane machines; and if they are successful there may be in many sections a concerted rush toward mechanization just as pronounced as that which has occurred on the wheat farms of the Great Plains.

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### COTTON QUALITY AFFECTED IN GINNING PROCESS BY MOISTURE IN SEED COTTON

Each season the problems encountered by growers and ginnermen in handling and ginning cotton seem to increase. There appears to be no single factor, however, so important to the ginning of cotton and to its resultant quality as the moisture content of the raw seed

cotton. It is commonly known, for instance, that where cotton of inferior preparation occurs it frequently is due to the ginning of seed cotton that has not been properly conditioned; that is, material which is early or so-called green-sappy, on the one hand, or late, dew-laden, or rain soaked, on the other.

When the cotton crop receives excessive rain during the growing season, heavy foliage and rank stalks prevent the maturing bolls from being sufficiently exposed to sunlight. Consequently, the bolls open more slowly, and the seed cotton possesses a high percentage of moisture, making it very heavy. It has been the general practice for growers to harvest and gin such seed cottons in this condition. In recent years, however, with prices declining, the growers have realized more than ever the need for rapid and adequate conditioning of their seed cotton before it is ginned. Some growers have renewed the old custom of sun drying and of storing their cotton in small cotton houses or cabin galleries for several days before ginning. Such practices, although possessing merit, are sometimes rather costly and cumbersome, and are hampered by unfavorable weather conditions.

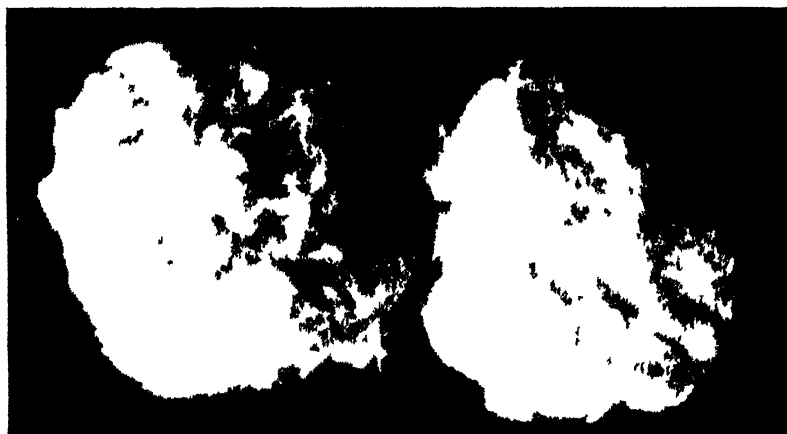


FIGURE 162.—Samples of lint from the same seed cotton, ginned by the sunbelt method, conditioned to two ways. Sample (left) from ginning green and damp early seed cotton without drying; sample (right) from ginning same cotton after drying in Government drier. Note the improvement in preparation of the sample caused by drying the seed cotton before ginning.

### Artificial Cotton Driers

The development and use of artificial cotton driers during the last few years, particularly in 1931, have afforded a practical and economical means of successfully drying seed cotton. Dependable units in both homemade and factory-built designs have been developed by the Bureau of Agricultural Engineering and by several commercial concerns, with the result that growers and ginners now have a wide range of choice in drying equipment.

A striking example of the variation in preparation, one phase of cotton quality, is illustrated in Figure 162. The two effects here shown resulted from ginning two samples of the same seed cotton adjusted to two different conditions of moisture. The sample shown on the left illustrates what is known as rough preparation, which results from ginning the seed cotton in a so-called green and damp

state. This cotton is undesirable for spinning. The sample shown on the right illustrates a very smooth and desirable preparation, obtained from ginning the seed cotton after it had been conditioned in a drier at the department's experimental ginning plant at Stoneville, Miss.

The two samples illustrated in Figure 162 have been classed according to commercial trade practices and quality descriptions as follows: The sample on the left, Strict Middling grade,  $1\frac{1}{8}$ -inch staple length, C preparation, neppy, irregular, stringy, and wasty; the one on the right, Strict Middling grade,  $1\frac{1}{8}$ -inch staple length, B preparation, and only slightly neppy.

### Good Effects of Drying Operation

In addition to the visible effects on the quality of the ginned lint, other beneficial effects were observed during the ginning of the two cottons. The seed from the artificially dried seed cotton were more completely cleaned than those from the damp seed cotton, and a better moting action was obtained with the former than with the latter. Ginning seed cotton with proper moisture content, therefore, appears not only to produce a product of better preparation, and frequently of better grade, but to eliminate many of the mechanical difficulties that arise in attempting to handle and gin damp seed cotton.

Additional laboratory analyses are being made on the various samples of seed cotton, ginned lint, linters, and seed that are coming from the department's experimental ginning plant. These samples represent the ginning of seed cotton of a wide range of qualities and of varying moisture content. They represent, also, varied mechanical organizations at the gin. The data are being accumulated and subjected to statistical analyses, which are expected to provide conclusions as to the optimum moisture content at which to gin each major type of seed cotton, with the range of mechanical organizations found in ginning equipment now in use or which will be developed in the future.

With the development and installation of driers, it seems highly probable that more efficient and successful ginning will result, and that it will be done more easily and economically than heretofore.

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### SEED-COTTON DRYING PROVES PROFITABLE; TWO TYPES OF DRIERS USED

It has become a rather general practice for cotton planters to bring or send their seed cotton to the gins as soon as it is picked, regardless of the amount of moisture it may contain. This is due, in part, to improved roads and transportation facilities and to the fact that many of the plantations are no longer equipped with facilities for storing the whole crop or for drying it naturally. Consequently much of the early and so-called green cotton received at the gin is sappy, and much of the late cotton is rain soaked or dew laden, or both.

A series of investigations intended to develop simple and practical means for artificially drying damp seed cotton, in order to make ginning easier, simpler, and more economical and to improve the quality of the lint, has been carried on since 1926 by the Bureau of Agricultural Engineering. As a result of these investigations a definite process has

been developed, now somewhat generally known as the Government process, which meets the special requirements for drying seed cotton and is adaptable to various types of cotton-drying equipment. In this process the damp seed cotton is subjected to a continuous current of hot air for from 45 seconds to 3 minutes, the temperature of the blast being held between the working limits of 160° and 200° F. and the amount of air between 40 and 100 cubic feet per pound of damp seed cotton. For the early green-sappy cottons, the lower temperatures of 160° to 175° seem most satisfactory, while the higher temperatures of 175° to 200° are generally used on late, rain-soaked cottons. Temperatures above 200° especially for the early cottons, appear likely to damage the cotton fiber. Therefore, until more information has been obtained from the studies under way or proposed, higher temperatures than 200° are not recommended.

From 1927 to 1930 the drying process was used in various designs of equipment, and two types of driers have been developed. In the first

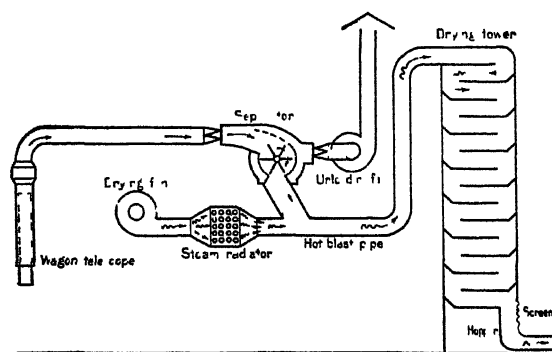


FIGURE 163.—Diagram of vertical seed-cotton drier installation

type, the seed cotton was dragged and rolled along four or six floors in a horizontal drying cabinet. In the later type the horizontal cabinet and conveyor chains are replaced by a vertical drying tower with no moving parts. These driers can be operated successfully in any kind of weather, if the dried cotton is conveyed immediately to the gin in the

heated air. Extremely wet cotton is handled in the horizontal drier by reducing the speed at which the cotton is carried through the cabinet and in the vertical drier by passing it through the tower a second time. The vertical-drier installation comprises an unloading fan, a separator, a drying fan, steam boiler and radiator for heating the drying air, and the drying tower. (Fig. 163.) The seed cotton from the wagon telescope passes through the separator and into the blast of heated air, which carries it into the top of the tower. As the cotton is tumbled and rolled down over the 13 to 15 staggered floors in the tower, the excess moisture is evaporated. The blast carries away this moisture, together with considerable trash and dirt from the dried cotton, through the screens in the side of the hopper at the bottom of the tower. From this hopper the cotton is drawn by the regular suction of the gin.

The vertical drier is of simple construction and may be homemade in sizes having sufficient capacity to supply a 5-stand cotton gin. The space required is not too great to permit installing the drier in connection with the standard widths and heights of cotton gins. The drying tower may be built outside the gin building. (Fig. 164.) The power requirements are approximately 30 horsepower of steam at from 50 to 100 pounds pressure for heating the air, and about 30 belt horsepower from motors, engine, or tractor for operating the fans and separator. As the drying tower and all the auxiliary features are dependable and

simple, such a drier can be built cheaply and will have a long life with little attention.

The cost of artificial drying has ranged, as far as the department's engineers have observed the practical operation of such equipment, from 40 to 90 cents per bale, and the net increase in value of the cotton has ranged from 60 cents to as high as \$5 or more per bale. Over 1,600 bales of damp seed cotton was commercially dried by one vertical drier in the 1931 season, and other gins reported having handled hundreds of bales each. A commercial 5-80 cotton gin, operating on long-staple cotton, reported that it has been successfully supplied



FIGURE 161—Tower of vertical seed-cotton drier erected outside of gin building

with dry cotton from its homemade vertical drier, and that the capacity of the gin has also been increased about one bale per hour during the 1931 season.

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## REMEDIAL PHYSICAL CONDITION OF FARM OFTEN HAMPERS USE OF MACHINES

In order that crops may be grown at a minimum expense, the mechanical equipment used in seeding, cultivating, and harvesting must be adapted to the particular farm on which it is used and must be efficiently operated. Each farm presents a separate and distinct problem wherein the proper relations between kind and amount of crop, livestock, and machinery must be determined.

The physical condition of the fields where the machinery is to operate must be taken into consideration when determining the type and size of machinery which will fit into a balanced farm program. The ideal condition for the economical operation of any field machine is a large, level field, free of all obstructions. While even the simplest machines can do their best work in such a field, sufficient data are available to establish that under such conditions the larger machines generally are more efficient than small ones. But as the size and regularity of the field decrease, and as the number of obstructions

increases, the size of the equipment that can be operated efficiently decreases until, at last, only 1-horse machinery is usable.

Except in certain sections of the West, it is probable that small, irregular fields are the rule rather than the exception. Recent surveys made by the Department of Agriculture show that on 11 typical farms in central North Carolina the average size of the fields is 3.7 acres; on 20 farms in as many counties in Georgia the average size of the fields is 5.6 acres; and on 11 farms in 6 counties in southeastern Minnesota the average size is 12.2 acres. The principal reasons for the smallness and irregularity of these fields are poor drainage, meandering creeks, open ditches, gullies, terraces, hedges, straggling and uneven timber, and steep hillsides.

The farmer should look over his land and see what changes and improvements can be made to better adapt it for machine operations. If there are large bowlders or stumps or small patches of timber obstructing farming operations they should be removed; wet spots should be drained and gullies should be filled and reclaimed. Such improvements add to the tillable acreage and lower the cost of operation of farm machines.

The kind and capacity of the machinery to be used should be taken into consideration in laying out the farming program, since the capacity of the equipment may be the controlling factor in fixing the acreage of the various crops. To some extent, the state of development of the machinery will determine what crops may be produced at a reasonable cost, since for some crops machinery has been developed for large-scale production through planting, cultivating, and harvesting, while for other crops only seeding, or seeding and cultivation, can be done by large machines.

### Many Other Factors to Consider

On farms where a diversity of crops is practiced, many factors other than machinery must be considered in planning the cropping program. Often, these other factors are of sufficient importance to determine the crop rotations and the sizes of the fields, and in such cases the machinery used must conform to the cropping program. It is not always advisable to use the largest machinery units, even though their operation costs per acre may be lower than those of smaller machines. It is desirable to keep the original investment in machinery at the lowest reasonable figure. The overhead and depreciation costs of farm machinery are high because much of the machinery is used only a few days each year. The overhead charges may be reduced by so planning the cropping program as to give maximum employment to each piece of machinery and to avoid investment in unnecessary equipment.

In order that any machine may do its best toward reducing the costs of crop production, it must be efficiently operated. Not only must the field be of proper size, shape, and condition, but the machine must be handled with the idea of securing from it a maximum amount of work at reasonable cost. For instance, a tractor should be equipped with enough tools so that every time it crosses a field it will be doing the economical maximum amount of work. Note that it is the "economical maximum" and not the "absolute maximum" which is desirable, since it is possible to make the load too heavy for good operation. In harrowing, it is generally better to keep the width of the harrow to that which can be pulled by the tractor in high gear rather than to

increase the harrow width until low gear must be used. In cultivating row crops, as the load is increased by increasing the number of rows, there is a loss of flexibility in operation which may be very expensive in the long run. Economical operation of farm machinery is to be obtained only by determining the proper relation between amount and kind of work, the conditions under which the work must be done, and the amount and character of the equipment used.

A great aid in the efficient operation of farm machines is familiarity with their construction and operation, so that ordinary troubles can readily be located and remedied. This minimizes costly delays in rush seasons. Finally, the machines should be carefully housed when not in use and the parts likely to rust should be thoroughly greased. At the end of the season they should be thoroughly inspected and notes made of any repair parts needed so that repairs can be made during the off season.

GEORGE R. BOYD, *Bureau of Agricultural Engineering.*

## TRACTOR'S ADAPTATION TO VARIED FARM OPERATIONS RAPID IN RECENT YEARS

Progress in the development of agricultural power and machinery during the last 25 years has been so great that to-day it is possible to operate a farm entirely without the use of animal power. Whereas formerly, plowing one furrow required the services of a man and a team of horses, to-day the same man may command a power unit capable of plowing several furrows at a time, and at faster speeds, without slowing down in hot weather and without the labor involved in caring for horses.

The first tractors were mainly adaptations of the stationary steam engine. They were cumbersome, and because of their ponderous weight they were ruinous to the soil and the ensuing crops. They were dangerous if in incompetent hands, and required constant attention. Hauling water and coal to supply the larger steam tractors, which could plow 8 and 10 furrows at a time, kept two teams and drivers busy continuously while the tractor was operating.

The first internal-combustion engine was made more than a century and a half ago, but it was not until 1876 that the Otto engine appeared. This was the first of the 4-stroke-cycle type, involving the principle upon which is built the internal-combustion engine of to-day. The intensive research and experimental work fostered by the rapid development of the automobile has contributed no small part to the refinements now found in gasoline tractor engine designs.

The first gasoline tractor, like the first steam tractor, was practically a stationary engine mounted on a frame supported on wheels and equipped with some sort of driving mechanism. The advantage of this mobile power plant over the steam tractor was soon recognized. However, there were yet many problems to be solved before the gasoline tractor would be practicable for general use on the farm. And these problems related not only to the mechanical details of mobility, cost, efficiency, and dependability but also to the development of adequate and economical supplies of liquid fuels.

Twenty-five years ago the gasoline tractor was large and cumbersome. The bore ranged from 8 to 10 inches, and the stroke around 15

inches. The engine speed was low, about 200 to 250 revolutions per minute. The so-called make-and-break ignition and the constant-level or overflow type of carburetor or mixer were most generally used. The road and plowing speed rarely exceeded 2 miles per hour. Three or four furrows were plowed at one time.

### Demand For Larger Power Units

The great Northwest was opening up at this time, with millions of acres to be put under plow. Consequently the demand was for larger power units. About 1909 2-cylinder tractors came into being. Four-cylinder tractors also appeared, which developed up to 80 horsepower and were capable of pulling 10 and 12 plow bottoms, but weighed as much as 25,000 pounds. A veritable road roller on the land! The bore of the cylinders was decreased and the engine speed was slightly increased, but the plowing speed was changed very little.

Toward 1912 the need of smaller power units became evident. The large, ponderous traction engines were not generally suitable for farm uses. Lower-powered, lighter-weight tractors with higher engine

speeds appeared, having one and two cylinders, and in some instances with two road speeds. These would operate under more adverse conditions and in smaller fields. Moreover, they cost less than their heavy predecessors, and the smaller repair parts also cost less and were easier to install.

Four-cylinder tractors with vertical engines running at 1,000



FIGURE 165.—General-purpose or row-crop tractor of common type

revolutions per minute appeared in 1914, light in weight and having three forward speeds. At this increased engine speed the make-and-break ignition system proved to be inadequate, because of inertia effects of the moving parts and because of the effect on timing resulting from wear of the many parts that compose this system. The perfection of the high-tension ignition system overcame the difficulty. Better and more positive carburetion was likewise needed at this increased engine speed, hence the development of the float-feed carburetor principle in general use to-day. The World War accelerated the development of this type of tractor, because of the scarcity of man power, and 1-man outfits were put on the market. Two-cylinder tractors of lightweight construction also made their appearance.

### The General-Purpose Machine

Since then the principal effort has been to adapt the tractor to performing all farm operations. It is worthy of note that a 30-horsepower tractor of to-day weighs approximately 3 tons, probably less than half as much as a tractor of equal power 20 years ago.

The power take-off was brought out in 1922. With that device, machines can be operated directly from the tractor and thereby relieved from dependence upon the ground-wheel drive. Previously, power was delivered by the tractor only at the belt pulley and at the drawbar.

The first general-purpose or row-crop tractor appeared about 1924, suitable in weight, power, and maneuverability for working on plowed ground, between crop rows, and in small fields. (Fig. 165.) Complete motorization of the farm was then possible. The expense of purchase, operation, and upkeep was sufficiently low to make the use of this tractor practicable on farms of moderate size.

The conventional general-purpose tractor is powered either by a 2-cylinder horizontal or a 4-cylinder vertical engine, mounted on a high-clearance chassis, with one or with two closely spaced guiding wheels in front and two driving wheels wide apart at the rear. The front wheels run between adjacent rows and the rear wheels straddle one or more rows. Because of the different row spacings required for different

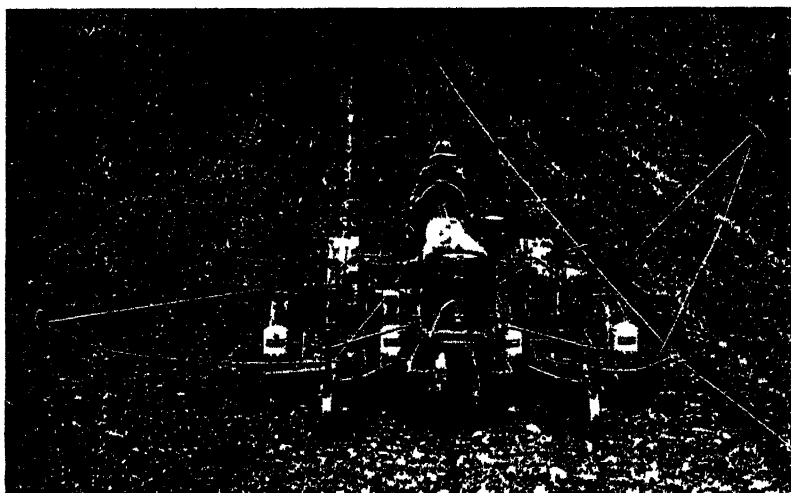


FIGURE 166 —General-purpose tractor with attachments, check-rowing four rows of corn at one time

crops, as well as the variation in spacing in the same crop in different localities, provision is made for adjusting the rear wheel tread. Wheel rim and lug equipment are variously designed to work to best advantage in different crops and in different soil types.

#### Attachments for Row-Crop Operations

Along with the development of this type of tractor came the development of attachments for performing the row-crop operations. In plowing and harrowing, the requisite tools are hitched to a drawbar that provides ample adjustment for operating them. For seeding small grains the drill may likewise be attached to the hitch bar. For seeding corn or cotton, attachments to the tractors are provided for check rowing (fig. 166), drilling, or listing up to four rows at one time. Fertilizer may be applied at the time of seeding by the use of a fertilizer attachment. After the crop has come up, cultivation until the crop is "laid by" may be continued with suitable implements pulled by the

tractor or with suitable tools attached to it. (Fig. 167.) Attachments are available for cultivating 2, 3, or 4 rows at a time. In spraying or dusting for insect control, as in dusting cotton or spraying potatoes, attachments may be mounted on the tractor and driven by the power take-off.

For cutting grass or hay crops, there are mower attachments driven by the power take-off, or two or more mowers may be pulled by the tractor. Sweeps and buck-rake attachments may be used for putting up the hay. Large grain binders are pulled by the tractor and operated by the power take-off. Small combines may be likewise operated from the power take-off; somewhat larger combines may be pulled by the general-purpose tractor while the mechanism is operated by a small auxiliary engine mounted on the combine. Corn binders are driven by the power take-off. Corn pickers are pulled by the tractor or, of different type, are mounted on it.

Potatoes may be planted, cultivated, and harvested with tractor-operated machines. For threshing grain, for ensiling or husking corn, and for operating other belt-driven farm machinery, the general-purpose tractor is a convenient portable power generator.

If the grain is to be threshed by a stationary thresher, the separator and tractor may be quickly lined up and the work started. If corn is to be

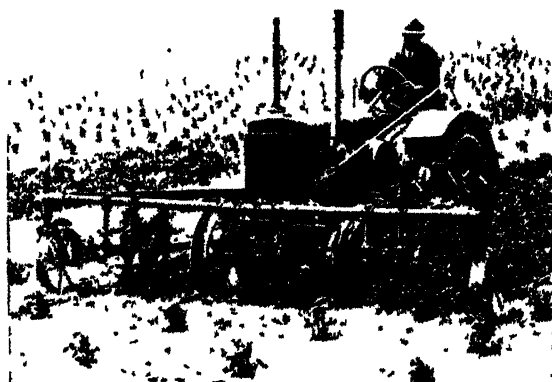


FIGURE 167—Tractor cultivation of corn

put into the silo, the silage cutter is driven by the tractor. If the corn is to be machine husked, the necessary belt power is easily supplied.

### Garden Tractor Devised

For motorizing farms that are divided into very small fields, such as those devoted to raising truck crops, the so-called garden tractor has been devised. Most of these develop between one-half and 2 or 3 horsepower at the draw-bar, though a few are somewhat larger. The operator walks behind, and guides the tractor as he would a horse plow.

The aggregate power available on farms in the United States is about 50,000,000 horsepower, while the connected horsepower of the manufacturing industries is approximately 40,000,000. The mechanical power on farms amounts to about 30,000,000 horsepower. The major part of this is now supplied by 1,000,000 tractors, four times the number reported by the census of 1920. A large and ever-increasing proportion of these tractors is of the general-purpose type. Farm trucks provide about 15 per cent of the mechanical power on farms. The number of these has increased from 139,000 in 1919 to 767,000 in 1929,

according to the census. With the increase in number of tractors and trucks has come a large decrease in the number of horses and mules. According to the 1931 Yearbook, the number of these on farms, January 1, 1918, was 26,428,000, and on January 1, 1930, only 18,643,000.

R. B. GRAY, *Bureau of Agricultural Engineering.*

## TILLAGE IMPLEMENTS OF NEW TYPES AND DESIGNS USED IN MODERN FARMING

Tillage machinery to-day comprises a vast number of different implements and tools necessary to meet the varied requirements of weed eradication, seed-bed preparation, cultivation, and other tillage operations essential to crop production. Furthermore, wide ranges of such factors as the size and kind of power unit, character of work to be done, soil type and condition, cropping system, and cultural practice require a multiplicity in both types and sizes of tillage equipment.

While a few crude implements were devised for tilling the soil in earlier periods, the active development leading up to present-day equipment began about the middle of the nineteenth century. By 1900, machines that were on the market embodied the fundamental principles of many modern tillage implements. Since that time development has been taking place at an ever-increasing rate. More recently the widespread use of the tractor, and especially the introduction of the general-purpose or row-crop tractor, not only called for a complete new line of implements but also opened up great opportunities for the inventor and the designer. A better understanding of the objects of tillage as well as of soil dynamics, and more fundamental information on the feeding habits of plants, have aided greatly in improving and standardizing soil-working tools. A greater knowledge of the treatment of metals has improved the quality and permitted the introduction of refinements in all classes of machines.

### Distinctive Features in Modern Implements

Some of the distinctive features found among present-day implements are: Improved construction, better lubrication, durable metals for cutting edges and wearing surfaces, convenient and adequate adjustments, a large selection of interchangeable tools, easy manipulation, and power lifts for raising the tools.

The plow has always been the basic tillage implement. Plow bottoms are generally of either the moldboard or disk type and differ in size and shape for different conditions. Gang plows with two or more bottoms are available to correspond to the size of the power unit. Attachments are provided to aid in turning under crop residues and pulverizing the soil.

The vertical disk plow (fig. 168) was first introduced on a large scale in 1927. This plow has certain features of both the disk plow and disk harrow. A series of vertical disks is carried horizontally at an angle of approximately 45°. The angle of the gang may be changed to regulate the depth of penetration. The vertical disk plow was developed for plowing wheat lands in the Great Plains area but has been successfully used under other conditions. Because of its rigidity the

plow is not well adapted to stony land. The furrow slice is not inverted and in grainfields the stubble is mixed with the soil, resulting in a ragged appearance. This, however, is an advantage in preventing soil from drifting and in obtaining good contact of the disturbed with the undisturbed soil. Draft is relatively light and rapid plowing can be done.

A combination plow and pulverizer known as the pulverator was introduced in 1928. This tillage implement is similar to a gang plow with short moldboards which only raise the furrow slice. By applying power direct from the tractor through the power take-off, slicing knives

mounted on a vertical shaft at the rear of the moldboard are rotated rapidly against the furrow slice, which is thereby turned and pulverized. The soil is pulverized to form a uniform seed bed during the plowing, with comparatively small increase in power consumption.

Attempts at direct tillage of the soil with rotating blades, hooks, and other tools are successful under somewhat limited conditions. There are many



FIGURE 168—A vertical disk plow operating on wheat-stubble land

plows for special purposes; they include subsoilers, listers, middle bursters, bedders, brush breakers, and hillside, cane, orchard, and vineyard plows.

### Types of Disk Harrow

For preparing the seed bed after plowing, the disk harrow is very effective in breaking down furrow slices, particularly of sod, loosening firm soil, and destroying weeds. It is often used before plowing to cut up any crop residue or trash and to loosen the surface of the ground. The single-disk harrow has a left and right gang of either full or cutaway disks, the angles of which can be changed to obtain different depths of penetration. The soil is thrown toward either side of the machine, thus leaving a slight depression at the middle and ridges at the sides. The tandem-disk type has a second set of gangs attached at the rear, arranged to throw the soil toward the center; thus the soil is more thoroughly tilled and ridging is counteracted. Special types of such machines are built for use in orchards.

The spike-tooth or smoothing harrow has been universally used for many years to smooth and finely pulverize the soil. It is also used to break light crusts and to destroy sprouting weeds after a crop is planted. The more advanced type has levers by which the slope of the teeth may be changed. Another form of smoothing harrow has a curved knife-tooth.

The spring-tooth harrow is usually of the same general design as the spike-tooth harrow except that it is of heavier construction and the

teeth are long, curved, flat springs set to penetrate the soil. This implement is particularly adapted to stony land because of the elasticity of the teeth. Since the points of the teeth are curved forward, firm soil is readily penetrated and roots of objectionable weeds and grasses are brought to the surface. The work of either a disk or spike-tooth harrow can be approximated with a spring-tooth harrow by regulating the depth of penetration.

For crushing clods and firming the soil, rollers are available in different designs, such as smooth, corrugated (single and double cylinder), tubular, and "crowfoot"

### Hitching Implements in Tandem

Two or more implements are frequently hitched in tandem for two reasons: (1) Several tillage operations are accomplished as one power unit travels over the field; and (2) tractor power is more efficiently utilized if a full load is drawn. In carrying this plan a step further, more than one of the standardized tillage mechanisms has been mounted on a single frame, or used in combination with seeding and fertilizing equipment.

Cultivators and weeders represent a class of machines ordinarily used after the crop has been planted. They are for loosening the soil, controlling weeds, ridging, and providing proper drainage. Distinguishing features of present cultivators are: Multiple-row units; many kinds of interchangeable shovels, blades, disks, and other tools; great adjustability; and suitable controls and guiding devices to permit cultivation close to the rows.

Cultivating equipment for row crops varies in capacity from one side of a single row for the 1-mule system of corn and cotton farming to the full width of 36 rows or more for large-scale tractor systems of truck farming. If a multiple-row cultivator is to be used, a planter of the same row size or multiple thereof must be used, and only rows that have been planted simultaneously can be covered by the cultivator at one time.

Horse-drawn cultivators of the  $\frac{1}{2}$ , 1, and 2 row types for corn and crops of similar row-spacing have the improved features previously mentioned, but their general design is similar to that of earlier machines.

### Motor Cultivators Introduced

In the use of mechanical power, motor cultivators have been introduced and one or more horse-drawn implements have been hitched behind the tractor. The general-purpose tractor recently introduced with suitable cultivating attachments, is readily adapted to the cultivation of various crops and different row spacings. A typical 4-row tractor cultivator is shown in Figure 169. The equipment, when mounted at the front of the tractor, permits direct guiding with the steering wheel, although on some machines the gangs may also be shifted. The gangs in some cases are raised by a power lift. Lister cultivators for tractors have guide wheels which follow in each furrow, thus permitting the mounting of hinged gangs at the rear of the tractor.

The rotary hoe used for early and shallow cultivation has only recently attracted much attention. It consists of two gangs of closely spaced, fingered wheels, free to rotate individually or in groups as the machine moves forward (Fig. 170.) The hoes or fingers are curved

to penetrate and loosen the soil. The rotary hoe is operated over the growing crop without material injury to the plants. It is effective in breaking soil crusts and destroying sprouting weeds. Rapid cultivation is possible since the draft is light and the operating speed may be

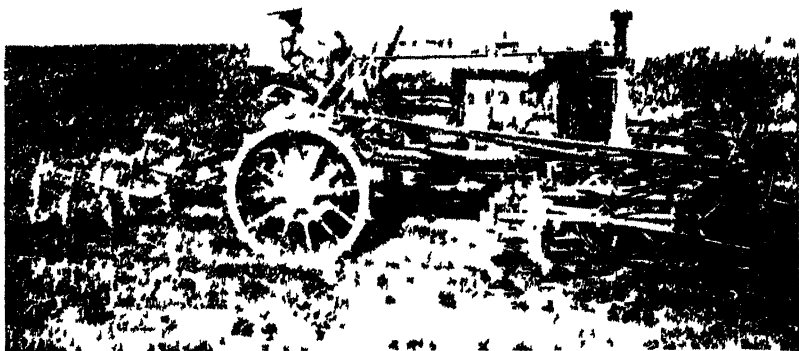


FIGURE 169.—Four row cultivating equipment mounted on a general-purpose tractor

relatively high. Light weeders with one or three rows of long slender spring teeth are used in a similar manner and for the same purposes as the rotary hoe.

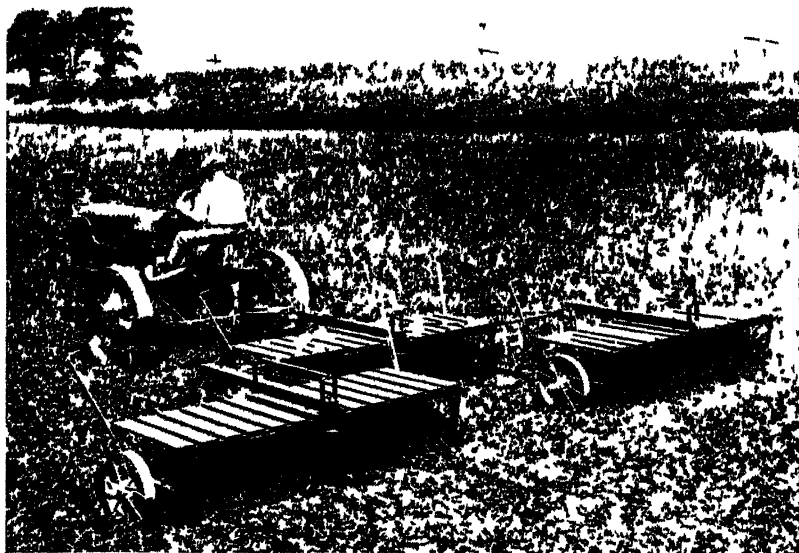


FIGURE 170.—Three rotary hoes cultivating young soybeans

#### Implements for Tilling Fallow Land

Among tillage implements for cultivating idle land in summer fallowing or after harvesting grain, the field cultivator either with stiff teeth or with duck-foot shovels is a late type. It is commonly built in sizes

of 6 to 12 feet width, and has a heavy frame with either rigid or spring tool shanks. The tools are staggered to permit some overlap of duck-foot shovels and to give sufficient clearance to prevent clogging. These cultivators thoroughly loosen the soil, form a clod mulch, and destroy any weed or plant growth, thus aiding to conserve moisture and in preventing soil drifting. Power lifts are provided for the larger machines.

Rod, knife, and other weeders of various types are also used for summer fallowing and similar work. The rods and knives extend continuously across the machine to insure the destruction of all plant growth. The most recent development is the rotary rod weeder in which a square rod revolves beneath the surface of the ground. The rotating motion is an aid in loosening the roots and in keeping the rod free of trash.

G. A. CUMINGS, *Bureau of Agricultural Engineering.*

## SOME TYPES OF HARVESTING MACHINERY REACH HIGH STATE OF DEVELOPMENT

Harvesting machinery for small grain has probably reached a higher degree of perfection than machinery for harvesting any other crop. The physical characteristics of such crops and the large amount of hand labor originally involved are chiefly responsible for the progress which has been made. Although the reaper, header, and self-binder greatly lessened the work of caring for the crop, a great deal of labor was still necessary in threshing the grain after it was harvested. As a further aid in reducing labor there is now a machine—the combine harvester-thresher—which cuts and threshes the grain in one operation.

The combine was developed in California in an area where grain is grown under rather large-scale production methods. For this reason the early combines were large machines. When it was demonstrated that the combine could be used successfully in practically all areas where small grain is grown, small combines were soon in demand for the Middle West and East. Small combines were also in demand for harvesting soybeans, clover, and alfalfa, as these crops are often grown on farms where the acreage is not sufficient to justify the purchase of a large machine.

### The Windrow Harvester

It was found that in some localities some crops could not be satisfactorily handled by the combine because of uneven ripening of the grain, the presence of weeds, or because of weather and insect hazards. The windrow harvester and pick-up attachments were developed to overcome these disadvantages. The windrower is in reality a header which deposits the cut grain in a windrow on the stubble rather than in a header barge. Under ordinary crop and weather conditions the stubble holds the cut grain up off the ground and any green weeds or damp grain will dry out in a few days. The pick-up is an attachment for the combine or for the combine platform and works in a manner similar to that of a hay loader. The cut grain is deposited on a conveyor and is threshed in the usual manner by the combine.

Some fundamental changes in design have also been attempted in order to produce a machine with fewer working parts and one which may be purchased and operated at a lower cost. However, the development of the combine is significant not only because it cuts and threshes

grain with less labor and expense than was formerly required but the first cost of a combine is often less than that of a threshing machine and the necessary harvesting equipment. From 1920 to 1930, inclusive, approximately 84,000 combines were sold in the United States.

The development and use of corn pickers, although not so spectacular as those of the combine, have been in progress for a number of years. The trend in design seems to be toward lighter but stronger machines of the 2-row tractor-operated type. Such pickers are operated by means of the power take-off, and are either pulled by a tractor or mounted on the tractor. While horse-drawn pickers are available, tractor power has proved quite satisfactory, in part because of the power take-off feature. The power take-off provides a more reliable form of power and a more uniform speed than power derived from a ground or bull wheel.

The combined harvester-thresher has had considerable influence on the design of corn pickers. At least one machine on the market is equipped with a tank to receive the corn from the husking rolls. Several attempts have been made to use the combined harvester-thresher for harvesting corn. Considerable work has also been done on a machine designed to harvest, husk, and shell corn from the standing stalk. Here again is seen an attempt to perform several operations with one machine.

#### The Cotton Harvester

The problems involved in the development of a successful mechanical cotton harvester are doubtless the most difficult of any which have confronted inventors and designers of agricultural implements. This is due largely to the physical characteristics of the cotton plant and to the wide variations in soil, weather, and crop conditions under which cotton is grown. There are at present two types of cotton harvesters in the experimental stage. The stripper harvester removes all of the crop at one operation, whereas the mechanical picker is designed to gather only the open cotton. The stripper is a comparatively simple and inexpensive machine, but it gathers a great deal of trash, leaves, and burrs along with the open cotton. Cleaners have been provided and changes made in the stripping mechanism to overcome these disadvantages. Considerable progress has been made along these lines but the use of the stripper harvester has been confined to northwest Texas, where conditions are more suitable for its use.

W. M. HURST, *Bureau of Agricultural Engineering.*

#### ERODED AND TERRACED FARMS REQUIRE SPECIAL METHODS AND MACHINERY

A rather complete assortment of tractors and tractor-drawn and horse-drawn machinery is available for preparing the seed bed, planting, cultivating, and harvesting all kinds of grain and hay crops. The larger units of this machinery, such as 2-row, 3-row and 4-row cultivators, hay loaders, sweep rakes, 8 and 10 foot grain binders, and harvester-threshers cutting from 10 to 20 foot swaths are comparatively recent developments and do very satisfactory work on level or gently rolling land.

On more steeply rolling lands in parts of the country where severe erosion damage occurs, more difficulty has been experienced in the use of tractors and the larger units of machinery. Accordingly farmers on eroding lands have generally continued to use the smaller and lighter-weight machines which were universally used a generation or two ago. As a result, farmers on eroded lands are suffering a reduction in acre yields due to depletion of fertility by erosion and at the same time their acre costs of operation are high as compared to those of farmers able to use more efficient equipment.

The problem of developing machinery for economical cultivation of eroded or terraced land has not received a great deal of attention until recently.

Land subject to gully erosion is usually cut up by natural ditches or gullies into small fields of irregular shape. It is not unusual to see a 40-acre field cut into three or more patches. When such fields are planted to row crops there are likely to be a good many short "point" rows. It is usually considered that turning at the ends of such rows can be done more conveniently with single-row machines. If a 2-row or larger machine is to displace the single-row machine under these conditions, it must be designed to work out close to the ends of the rows and to turn around quickly in a small space.

On eroding land there are usually a good many small field ditches that are inconvenient to cross but still more inconvenient to go around. Small lightweight machines have some advantage in working over such ditches. With larger and heavier machines there is more inconvenience in crossing ditches and more danger of breakage.

#### Flexibility in Machines Essential

The ground surface is always uneven on eroding land because soil is carried away by water flowing down between crop rows or natural depressions. Unless machines have an unusual degree of flexibility, uneven ground surface causes uneven depth of penetration of seeding and cultivating machinery. This results in poor stands of crops and poor control of weeds. These difficulties are considerably increased with larger machines unless they are specially designed to give flexibility.

When traveling across the slope of the land, machinery tends to slip sideways downhill. This makes it difficult to follow crop rows. Unless specially designed for this condition, a 2-row cultivator is more difficult to manage than a single-row walking cultivator. In some localities crop rows are usually planted on contours; that is, the rows curve around the hill on level lines. Cultivators sometimes do not follow these curved rows accurately enough to prevent damage to the crop.

The difficulties mentioned above apply particularly to eroding land that has not been terraced. When the land is terraced the natural field ditches are eliminated. To this extent, terracing very materially improves conditions for the use of larger units of machinery. On the other hand, the terrace ridges themselves must be farmed and they offer some obstruction to the use of machinery. A machine that will successfully cultivate a terrace ridge must have a great deal more flexibility than is required for cultivating level land. (Fig. 171.) A single-row walking cultivator can work over terraces without difficulty (fig. 172), but 2-row cultivators are less flexible and are not always satisfactory for terraced land.

### Steep Slopes Present Difficulty

The problem of designing machinery with enough flexibility to work satisfactorily over terraces might seem simple at first thought. There is no great difficulty in designing machines to work well on terraced land having slopes of 5 per cent or less, but much cultivated land is



FIGURE 171 —Four section harrow tilling top and sides of a terrace A flexible assembly is necessary for satisfactory results

considerably steeper than 5 per cent. (The percentage of slope is the number of feet rise in 100 feet of horizontal distance.) In parts of the Corn Belt and general-farming regions, fields having 15 to 20 per cent slopes are not uncommon. In the wheat areas of the Northwest, slopes as steep as 60 per cent are under cultivation.



FIGURE 172 —Single-row cultivator with balanced frame operating satisfactorily across terraces

Until recently erosion has not been considered a serious problem on the wheat lands of the Northwest. No system of terracing for control of run-off on such steep slopes has yet been devised. Mangum terraces are not adapted to land having slopes much if any steeper than

about 15 per cent. On terraced land with 15 per cent slope, machinery will require a high degree of flexibility in order to operate satisfactorily. Row-crop machinery will also require ability to stick to the side of the hill without slipping sideways. (Fig. 173.) The required degree of flexibility will be especially difficult to attain in hay machinery such as side-delivery rakes, sweep rakes, and hay loaders.

To solve the problem of adapting large machinery to necessary measures for control of erosion requires cooperation between machinery manufacturers and those who design terraces. The machinery manufacturer will need to go as far as he can economically go in adapting his machinery to the desired shape of terrace; then the farmer may have to modify the desired shape of terrace to meet the limitations in machinery design.

Farmers may also have to use more ingenuity in operating machinery over terraced land. Farmers in the Northwest have learned to operate large harvester-threshers on 60 per cent slopes, not terraced. Probably no greater difficulties will be involved in operating well-designed machinery over terraced land having 15 to 20 per cent slopes such as found in general farming regions.

It is evident that changes are necessary in methods of farming lands subject to severe erosion. If these lands are to continue in cultivation, erosion-control methods that will prevent soil destruction and make maintenance of fertility possible must be adopted. To operate this land profitably, it appears necessary also to provide efficient operating equipment that will enable farmers to produce crops at low cost.

CLAUDE K. SHEDD, *Bureau of Agricultural Engineering.*



FIGURE 173.—Two-row tractor planter working along the lower slope of a terrace

## RURAL ELECTRIFICATION GROWS AS FARMERS FIND NEW USES FOR ELECTRICITY

In this power age, no single agency has brought such comforts and conveniences to the farmer and his family as the use of electrical energy, which is now fast becoming an economic factor and a force for efficiency.

To-day about 1,000,000 farms are using electricity, supplied either by electric-power companies or by individual plants. Of this number, more than 644,500 have high-line electric service. This is 10 per cent of all farms in the country. It is nearly four times the number so served in 1923. Since that year there has been a steady increase in the number of farms served with electricity, and the last year's gain of 90,800 over the 1930 total is the greatest increase made in any one year. The estimated number of independent or unit farm-lighting plants is between 300,000 and 400,000.

As the farmers have learned the value of electricity, the consumption has likewise increased. During 1930, farmers bought 1,779,940 kilowatt-hours of electrical energy at a cost of \$46,187,000, according to a recent report of the power industries. The consumption is equivalent to 2,385,000,000 horsepower-hours of energy reported as used annually by farmers.

Supplying electrical energy to farmers began about 1899, when a power company extended service to several small towns in California and contracted generally to supply power to farms for driving irrigation pumps. Between that time and 1910 the gasoline engine was gradually superseded by the electric motor, and since 1910 electricity has been the preferred power for irrigation pumping in California. Rural electrification has proceeded rapidly, until to-day it is estimated that between 60 and 80 per cent of all California farms have electric service.

Use of electricity on farms in other States developed less rapidly. The principal reasons doubtless were the larger average size of farms, with fewer users per mile of transmission line, and the lack of some general use like irrigation pumping for large amounts of power. By 1923, however, farmers in many sections of the country had become insistent in their demands for electric service, yet the utility companies felt they could not deliver the power at a price that the farmers could pay.

### Committee Studies Problem

In furtherance of a common interest, a committee on the relation of electricity to agriculture was formed to study the problems of economical distribution of current in rural districts and of profitable use of electricity in agriculture. On the original committee were representatives of the power interests, of farm organizations, of manufacturers of electrical equipment, and of several governmental departments. It was recognized that rural electric service, to be a success, must yield a profit to the farmer and also to the power company.

The committee adopted a program of investigation to find out what electricity could do and what it could not do advantageously on the farm. The studies were conducted in cooperation with State agricultural experiment stations, where laboratory facilities and a trained personnel were available, and in the beginning were supported largely by contributions from private agencies. Where the studies have grown to major importance, State funds have been made available for continuing or enlarging them.

Prior to 1923 there was no organized program of research in electrification of farms. Some progress had been made in studying the use of electricity in pumping for irrigation and for drainage; in the dehydration of fruits, nuts, and hops; and in operating individual water systems and lighting plants. Little attention had been given to developing special uses in the farm home and about the farmstead.

Following the formation of the national committee, State committees were set up; in fact, such a committee was organized in Minnesota before the national committee. The State committees include representatives from agricultural experiment stations and agricultural extension services. They are devoting their efforts largely to the development and testing of equipment and methods for the immediate use of electricity on farms, and many have become extension agencies. Local conditions determine whether a committee puts primary emphasis upon research or upon extension work, or undertakes both lines of activity.

### Information Widely Spread

As rapidly as experimental practices are proved satisfactory through research studies, the information is spread by demonstrations and other methods. Some activity in rural electrification is in progress by the agricultural colleges in 40 States, 14 of which have definite exten-

sion programs. Educational expansion programs in farm uses of electricity are increasing in agricultural colleges. Such programs have for their foundation the facts obtained through research.

Minnesota was the first State to have an experimental farm electric line. It reached nine farmers near Red Wing, whose farms were equipped with all kinds of electrical appliances, loaned by manufacturers, such as motors, feed grinders, electric stoves, milking machines, and vacuum cleaners—also pumps and water systems. This line and similar lines built in 15 other States furnished data on the uses and costs of electricity, and more farmers began to request the service. As a result, power companies and equipment manufacturers have seen fit to improve their services and products.

Since 1924, the power companies have improved their equipment to furnish 24-hour-per-day service. They are building farm lines more cheaply, and have discovered that, if the farmers of a community use electricity as it can be used, they will use as much power, and in many cases, more, than the average urban community of equal line mileage. Many electric light and power companies have installed rural-service departments to work with farmers on elec-

trification, and to give advice on wiring farmsteads. They realize that inadequate wiring alone may limit the amount of electrical energy used to much less than the farmer could use profitably.

Manufacturers of equipment are cooperating with the agricultural engineers and the power companies and with the farmers in designing and producing appliances at prices the farmer can pay. They are re-designing and improving such equipment as feed mills, silage cutters, brooders, and milk-cooling and storage plants. Some new equipment, such as poultry water heaters, has been designed. Manufacturers have redesigned their lines of power-operated equipment to make them suitable for electric-motor operation, and are making portable motors mounted on wheeled trucks, and smaller sizes that can be carried by hand. (Fig. 174.)

The popular uses for electricity on the farm are lighting, running small household appliances (fig. 175) and operating water systems



FIGURE 174—Sharpening mower knives with portable-motor grinding rig

(fig. 176). Where availability of this convenient form of power has led to the installation of running water, it has done more than any other one thing to make farm living enjoyable. In designing household

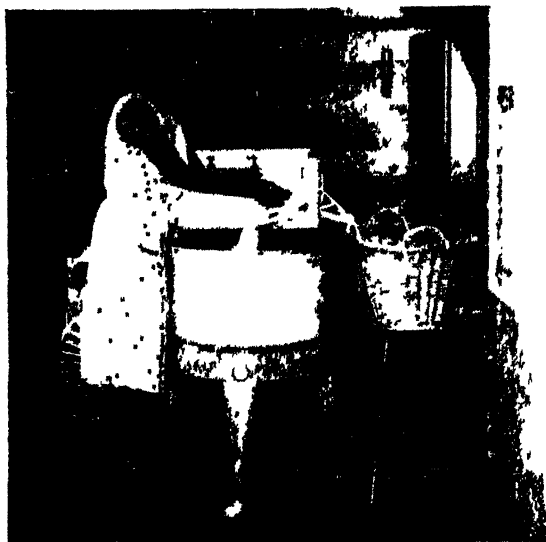


FIGURE 175—Corner of an electrified farm laundry

refrigerators and domestic water-supply systems, the makers are taking advantage of automatic control. Several feed-grinding plants also have been built with either automatic or semiautomatic controls.

### Supplanting Hand Labor in Dairying

Electricity is proving highly useful on many dairy farms, where it is taking the place of hand labor in doing burdensome chores. It runs the milking machine and drives the cream separator. It cools the

milk, or makes ice for keeping the milk cool on the way to town. It pasteurizes the milk, washes and sterilizes the bottles and caps them. It runs the separator and churn. It sterilizes the milk cans, solders holes in them, heats water for cleaning the dairy, runs the ventilating fans, and helps in cleaning the cow stalls.

On poultry farms, electricity is used to hatch eggs in incubators, to brood the chicks, to warm drinking water, to run fans for ventilation and for drying litters, to sprout oats for green feed, and to operate a spray gun in killing vermin. An electric motor runs the feed grinder, mixes the feed, cleans the grain, and elevates feed or grain into the bins. A very general use of electricity is for lights to prolong the feeding period and secure increased egg production during the winter.

Large fruit farms are using electricity in spraying, fruit washing and grading, cider pressing, and refrigeration in cold-storage plants.

Among the more recent uses of electrical energy is the heating of soils and hotbeds. Some experimental work in these lines has been

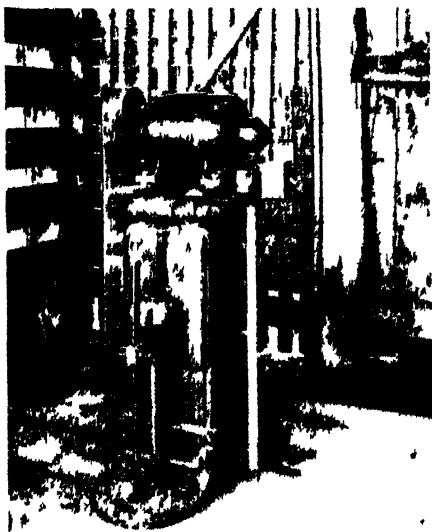


FIGURE 176—Electrically operated farm pump, with automatic shut-off switch

conducted by several agricultural experiment stations, with promising results. Electricity has been found particularly useful in operating equipment for dehydrating crops where close regulation of temperatures must be maintained.

In the use of electricity for heating soils and hotbeds, Norwegian and Swedish engineers were the pioneers. Farms in many European countries, particularly Germany, Norway, and Sweden, are supplied with central-station service, and electricity is used for lights and many small power applications about the farmsteads. Sweden has thousands of electrically operated threshing rigs. Much of the research pertaining to the use of electricity in agriculture has been initiated outside of the United States, and includes electric plowing in France, silage making in Germany, soil heating in Norway, and electric seed treatment in Australia. The latter country offers available electricity as one of its chief inducements to attract farmers.

S. H. McCROY, *Bureau of Agricultural Engineering.*

## AMERICAN MACHINERY IS INFLUENCING AGRICULTURE GREATLY IN OTHER LANDS

The design and development of farm machinery and the application of mechanical power in agriculture in the United States have been reflected, to a greater or less degree, in the changing agricultural practices in other lands. The use of American-made machines, and the changes in foreign designs to correspond, have contributed in no small way to the adoption of more efficient methods in producing crops.

This change was considerably accelerated by the World War, which drew heavily on the able-bodied man power of the farms of Europe. The urge for greater accomplishments by one pair of hands became paramount. Tractors, tractor plows, and other power machinery were imported, mainly from North America, to increase the output of the average worker. Adoption of such equipment has involved radical change or abandonment of many time-worn customs suited only to small-scale production, in order to operate on a larger scale. Small fields, in many instances smaller than 5 acres and adapted only for horse-drawn machines, were joined. This required the filling of drainage ditches, the removal of hedges and stone fences, and often the utilization of land that had not been cultivated for centuries; all to permit of using the more efficient power and machinery methods.

At the close of the war, the increased living costs resulted in a demand by farm labor for higher wages. This condition hastened the adoption of labor-saving agricultural machinery, until now nearly every country in western civilization uses American machinery and methods.

### One-Man Outfit Adopted

Before tractors were used extensively in Europe, the plows in common use cut furrows less than 12 inches wide. If pulled by tractors the plows were, in many cases, adaptations of horse-drawn equipment and two men were required to operate them—one to drive the tractor, the other to ride the plow. With the arrival of American tractors and plows, 1-man outfits were available, as the plows were of the self-lift type and could be adjusted from the tractor-driver's seat by easily

accessible levers. The plows cut 14-inch furrows, and in many cases they were fitted with rolling colters, a radical departure for Europe. Considerable objection was raised at first because of the extra width of furrow, the type of share and moldboard, and the colter; however, the 1-man outfit was soon accepted as economical.

To keep pace with the advancement in tillage equipment and to utilize the power available in the tractor, larger seeding units were needed; 8-foot and 10-foot drills, in many instances hitched in twos, threes, and fives, speeded up the planting of grain. The cultivating equipment already in use in Europe was less difficult to adapt to use with the larger power units. Existing implements were hitched together fairly successfully, although some American machinery appeared, including the rotary hoe and spring-tooth and disk harrows.

For grain harvesting, the binder of American origin was introduced. At first it was used singly, but when tractor power became available hitches were devised that permitted hauling as many as six 8-foot binders at one time. This was necessary to keep in step with the large-scale tilling and seeding operations noted above. Threshing formerly was done by the European thresher of practically all-wooden construction, which was fitted with a fluted bar-type cylinder. With this machine probably only 400 bushels per day could be threshed. In certain parts of Europe this type of thresher is gradually being superseded by that used in North America, with all-steel body and spike-tooth cylinder.

### American Type Haying Tools Used

For handling forage and hay crops, tractor-mower attachments have been adopted, together with other American-type haying tools. Hay balers, capable of baling hay or straw into more compact units than was previously possible, have come into use in some regions. This has aided handling and has minimized the storage space requirement. Hay driers are in use in some places, to a limited extent.

Because of the wide application and the practicability of the combine harvester-thresher in the United States, a number of the foreign countries have appreciated its worth and imported such machines. Some have even started to manufacture them. Great Britain, Germany, and Russia are harvesting considerable acreages of grain with this creation of the New World. With the advent abroad of this machine there arose, as in the central and eastern parts of the United States, a need for grain driers. Investigations of equipment for this purpose are in progress, and a few driers are in regular use.

Many other machines and operations have been affected by developments in the United States. Among these is machinery for the production and harvesting of sugar beets and of potatoes, also machinery including the silo filler, used in the production and processing of corn. The manure spreader is another machine of American development that has been adopted in Europe. Formerly manure was pitched from the barnyard into the wagon, taken to the field, and dumped in piles from which it was laboriously spread with pitchforks. On the more modern farms litter carriers and manure spreaders have been introduced, thereby reducing the amount of labor required and making possible the more uniform application of the manure to the land.

## Applications of Electricity

As a result of the intensive studies and adaptations for using electricity on farms in the United States, certain applications have spread abroad. Some types of crop driers now make use of this power. Some milking machines are also operated by electricity. Some Europeans have gone a step farther than Americans, however, in rural electrification, and have developed a practical cable plowing outfit.

Adaptations and applications of the agricultural machines that have been mentioned may be found in many quarters of the globe, and their use is becoming more general and is extending into new regions. Although this discussion applies mainly to Great Britain and continental Europe, American machines and methods have penetrated to Egypt where tractors are used in leveling for rice growing and a wide variety of agricultural tools and corresponding practices have been adopted, and to South America, where harvesting is carried on in Yankee fashion.

The importance attached to our part in increasing production and reducing costs in agriculture is clearly emphasized by the exhaustive tests being made of American machines at the more important foreign agricultural experiment stations. Our exports of farm equipment reached a maximum value of \$112,870,000 in 1929. This was roughly one-fourth the value of all farm equipment sold by United States manufacturers in that year. More than half of this export value was in tractors, and more than one-fourth in harvesting machinery, plows, and listers. Agricultural engineers and others from many lands are studying American farming practices, which shows that American resourcefulness and ingenuity are greatly influencing the agricultural readjustment of the world, and that the progress made on farm machinery in the United States is being keenly watched abroad.

R. B. GRAY, *Bureau of Agricultural Engineering.*



# OUR LAND USE PROBLEM

## LAND-UTILIZATION PROBLEM, INTENSIFIED BY DEPRESSION, DEMANDS NATIONAL POLICY

The expression "land utilization," formerly principally a technical term, has come to have significance for the average citizen. During the last decade more and more interest in the problems of land utilization has developed.

This awakened interest grows out of a number of significant changes in the rural economy of the Nation. Formerly our national outlook was unlimited increase of population and a continually increasing pressure on available land resources. Even a decade ago the food shortages of the World War, wrongly attributed to scarcity of land rather than to scarcity of labor, gave rise to extensive plans for stimulating agricultural expansion.

This outlook has been materially altered during the last decade, as is brought out in more detail in other articles of this YEARBOOK. Birth control, under the impulse of urban standards of living, and restrictions on immigration forecast an ultimate population probably not more than 20,000,000 greater than at present—a population that may even decrease in time. The increase of populations of other industrial nations, comprising hitherto the best markets for American farm products, shows similar tendencies, and the export markets for our farm products have been materially restricted by foreign trade policies and credit dislocations. Competition in our export markets and even in our domestic market has been intensified by the expansion of farming into semiarid areas, extensive land reclamation in various countries, the recovery of European agriculture including that of Russia, and the increased production of tropical products. Throughout the civilized world national policies have aimed at stimulating agricultural expansion. Much crop and pasture land in our own country has been economized through the substitution of mechanical power for horse power. There has been a notable expansion of our farming area in the Great Plains and through the reclaiming of fertile areas with favorable topography in various parts of the country, at the expense of less-favored lands formerly advantageously cultivated.

Our outlook with regard to what our lands will be needed for and can be used for has been profoundly altered by these developments, as well as by a better knowledge of our potential land resources. We now know that, in the present century at least, we shall not need to cultivate quite half of our potential arable acreage and that we can

devote more than one-fourth of our total land surface to forests, wild-life refuges, or other uses, without encroaching seriously on land required for crops and pasture.

### Problem Emphasized by Prolonged Depression

A decade of subnormal economic conditions in agriculture, culminating in a drop into probably the deepest abyss of depression American farmers have ever experienced, has created serious problems of adjustment in land utilization, especially in those sections where topography, soil, and climate are not especially favorable to present-day methods of farming. Extensive areas of farm land have become tax delinquent or have been abandoned. In many of these regions tax delinquency is further increased by the presence of large areas of cut-over land on which the owners are no longer able or willing to pay taxes. Tax delinquency and farm abandonment, in turn, have created serious financial problems for townships, counties, and States. As revenues are reduced, the burden of taxation is increased for those farmers and timber owners who remain, and the justification for maintaining certain schools and roads in areas where the population is thinning frequently becomes questionable.

The solution of this extensive problem of idle lands will require the cooperation of Federal, State, and local governments. For one thing, it is wholly illogical to continue the policy of attempting to resell foreclosed lands not adapted to private utilization, in accordance with the immemorial practice of most of the States. Few States at present have any systematic program for administering the large areas of tax-delinquent lands that they are being forced to take over and retain through lack of a market. In some States such lands are taken over by the State itself, in other cases by the counties, or even by townships or minor civil divisions. Many of the units of local government neither can afford to lose the revenues from the tax-delinquent lands nor are competent or financially able to undertake the administration of large areas of idle land. This does not mean that in some instances the development of county forests or parks may not be desirable, but merely that units of local government in general are quite incapable of dealing adequately with the problem of idle land as a whole.

### Tax Problems Attacked Along Several Lines

It is clear that the idle-land problem interpenetrates the whole difficult problem of State and local taxation. It is generally recognized that rural real estate is bearing a disproportionate share of the total State and local tax burden. In many cases private utilization of land is being penalized and lands forced into tax delinquency which could continue in private ownership under a more moderate tax burden. The solution of these problems will require a number of lines of action, some of which have already been undertaken in certain States. These include:

- (1) Assumption by the State of part of the cost of local government in order to lighten the burden on rural real estate.

- (2) Better adjustment of the tax burden in accordance with the tax-bearing capacity of various classes of land.

- (3) Economics in local government through—(a) elimination of schools and roads in sparsely settled areas, this perhaps depending upon

a program of encouraging the complete abandonment of residence in such areas and zoning against resettlement; (b) increasing the efficiency of local offices and services so as to reduce costs; (c) consolidation of functions either through the cooperation of counties or through combining them in larger units.

### Public-Ownership Program

After all these various adjustments are made, however, it is becoming clear that we shall have to provide for a larger program of public ownership of land. This grows out of the fact that in our earlier land policy we threw into private ownership lands which should have been retained for public advantage. For one thing, there is a large acreage that falls below the margin of profitable private utilization. This is the case with much of the cut-over land and with a good deal of the poorer farm land, especially where the fertility has been impaired by erosion or overcropping. We have permitted private individuals to skim the cream, and now we shall be forced to dispose of the skim milk. Furthermore, there are classes of land that can not continue in private ownership without a detriment to public welfare. Such lands include: (1) Farms in sparsely settled areas which entail unduly high costs for the maintenance of public institutions and services; (2) lands that can not be profitably utilized by private individuals without serious soil wastage; (3) lands that should be retained in forests or pasture in order to protect watersheds; (4) timbered areas that should be managed on a permanent-yield basis because the local agriculture and industry are essentially dependent on a continuous supply of timber; (5) bird and game refuges; (6) areas especially adapted to serve as recreational areas which should be preserved for public use as Federal, State, and local parks; (7) lands that periodically are thrown into cultivation in periods of high prices or unusual rainfall but are not adapted to permanent cultivation; (8) miscellaneous areas needed for various public uses, such as military reservations, water power and reservoir sites, etc.

### Guidance of Land Settlement

Another important element in national land policy is the more adequate guidance of land utilization and settlement. It is generally recognized that past and present methods of land settlement result in serious mistakes and are extremely wasteful both of land resources and of human life and effort. A vast amount of money has been wasted also in the development of ill-advised drainage and irrigation projects, as well as in land settlement by private individuals. The continued application of our homestead policy to areas incapable of maintaining a family on the amount of land allotted, also leads individuals into futile and costly attempts at land settlement, besides injuring the established range industry.

The essential basis of all the various types of readjustment that have been mentioned in this article is an official economic classification of land to determine what class of use it is best adapted to, and whether it is best suited for private or public ownership and utilization. Such a classification should be modified from time to time as conditions change.

We have also reached the parting of the ways in the matter of reclamation policy. It is frankly admitted by advocates of Federal reclamation that the areas remaining to be reclaimed by irrigation can not be reclaimed at costs that can be supported by farming alone without some form of governmental subsidy. It is being proposed that, in addition to granting interest-free funds, as in the past, the Government subsidize reclamation further by utilizing the revenue derived from power developments. There is active agitation for the extension of Federal reclamation to the drainage of lands in the humid sections of the country, more or less in connection with flood-control projects. In the next few years the American people will need to determine whether Federal and State land policies shall be directed toward the stimulation of agricultural expansion or whether such stimulation is justified in view of the perennial tendency toward overexpansion.

### Consolidation of Scattered Holdings

Another important task is the consolidation of scattering land holdings which are not sufficiently compact or of a size adequate for economical utilization. The homestead policy and grants of alternate sections to railways and scattering sections to States has resulted in thousands of units in dispersed ownership, Federal, State, and private, frequently by absentees. Bringing together these scattering holdings into units adapted to economical use or administration will be an important objective in future land policy.

The remaining public domain itself, now utilized as a grazing commons, has been subjected in many places to a régime of competitive grazing which has seriously depleted the forage cover, resulting in increased erosion and contributing to the severity of flood devastation, not to speak of the confusion and uncertainty to which the livestock business has been subjected. Opinions differ as to whether the solution will consist in turning these lands over to the States in which they lie, after reserving certain areas for Federal retention, or whether it should take the form of regulated utilization under Federal auspices. A presidential commission has recently recommended in substance the first-mentioned policy.

L. C. GRAY, *Bureau of Agricultural Economics.*

### NATIONAL CONFERENCE RECOMMENDS PROGRAM OF STUDY AND ACTION

The National Conference on Land Utilization held at Chicago, November 19 to 21, 1931, was probably the first important gathering in the history of the United States to outline a comprehensive national land policy, as distinguished from topical or regional segments of a policy. The conference was called by Arthur M. Hyde, Secretary of Agriculture, in collaboration with the Association of Land Grant Colleges and Universities.

Representatives were present from the United States Department of Agriculture, most of the land-grant colleges and universities, the Federal Farm Board, the Bureau of Reclamation, the Federal Farm Loan Board, the Federal Board for Vocational Education, the Asso-

ciation of Commissioners and Secretaries of Agriculture, the leading national farm organizations, a score of the most important railway systems, the Chamber of Commerce of the United States, and about two score organizations concerned with banking, insurance, forestry and conservation, land economics, engineering, and the farm and news press. Probably no more widely representative and experienced group ever met for the consideration of national land problems. More than 350 delegates were registered.

The program of the conference provided for two days of addresses, papers, and informal discussions, and a third day devoted to the consideration and adoption of recommendations of the conference, formulated by a broadly representative committee. The proceedings of the conference, which include addresses by the Secretary of Agriculture, the chairman of the Federal Farm Board, and a large number of papers by foremost authorities on land problems, constitute a comprehensive and significant manual on the subject of land policy.

### Significant Recommendations Adopted

The conference adopted a group of significant recommendations as the majority sentiment of its membership. In general, these recommendations look toward the rationalization of agricultural production and land utilization, the conservation of national resources, and the safeguarding of the national welfare in the use of land.

The conference recommended Federal administration of the public domain, with a view to the rehabilitation of public ranges and the protection of watersheds; the consolidation of scattering State and Federal holdings through exchange; the expansion of the outlook program of the United States Department of Agriculture, an inventory of land resources and an economic land-use classification as a basis of land policy; restriction of homesteading to lands capable of maintaining a decent standard of living on the maximum area granted; tax reform to relieve the excessive burden on farm and forest land and adjust taxation to the type of utilization for which each class of land is adapted and to its tax-bearing ability; licensing and regulation of land-settlement enterprises; restriction of Federal reclamation to the completion of projects already started and the rehabilitation of deficient water rights on lands now cultivated and occupied, with no new reclamation projects to be initiated until justified by the agricultural needs of the Nation; steps for the prevention or reduction of soil erosion and other forms of soil depletion.

The conference devoted special attention to the problem of submarginal land. It recommended the coordination of State and Federal policies to withdraw submarginal crop lands from cultivation and utilize them as forests, game refuges, and other purposes. In this connection the conference recognized the need for discontinuing the resale of tax-delinquent land not adapted to cultivation and the necessity for a broader program of Federal and State acquisition and administration of lands not adapted to profitable utilization by private enterprise.

### Two Permanent Committees Recommended

In order to insure the carrying out of its recommendations the conference requested the Secretary of Agriculture to take steps for setting

up two permanent committees, namely, a national land use planning committee and a national advisory and legislative committee on land use. The membership of the first committee, which is a technical body, is to include representatives from various Federal bureaus dealing with rural lands, and representatives of the Association of Land Grant Colleges and Universities. The advisory and legislative committee will comprise representatives from the principal national farm organizations, the Chamber of Commerce of the United States, the National Association of Commissioners and Secretaries of Agriculture, the American Forestry Association, the American Agriculture Editors' Association, the American Railway Development Association, the National Sheep and Wool Growers, and the National Livestock Association.

L. C. GRAY, *Bureau of Agricultural Economics.*

### PRESENT TRENDS INDICATE FARM AREA OF UNITED STATES NOT LIKELY TO INCREASE MUCH

In studying the land problem the first step is to consider the probable future need for farm land. This is dependent, obviously, upon the future consumption of farm products, on the one hand, and upon production per acre on the other hand. Let us consider first the prospect for consumption of farm products. This depends, in turn, upon three factors, population growth in the United States, consumption per person, and exports.

The most important of the factors affecting the future need for farm land is the Nation's population. At present over 90 per cent of the farm land is used to produce for the domestic market. Ten years ago, indeed as late as 1923, the population of the Nation was increasing nearly 2,000,000 a year. Now the increase is scarcely 900,000. (Fig. 177.) Between 1921 and 1931 the number of children born in the United States dropped from about 2,940,000 to about 2,300,000, net immigration declined from 300,000 in 1921 and 1922 to a net loss of over 70,000 in 1931 (emigrants exceeded immigrants), and the number of deaths increased. The increase in deaths was not because people were dying younger, but because there is an increasing number of old people. The number of people over 65 years of age increased 34 per cent between 1920 and 1930, according to the census, whereas the number of children under 5 years of age decreased 1 per cent. Because of the increasing number of old people, deaths will almost certainly increase more rapidly in the future.

The prospect is for an increase in population during the next 10 years of about half that shown by the census for the decade 1920-1930, unless the immigration restrictions are relaxed; for an increase in the decade 1940-1950 only about a third as large as that in the past decade; and for a stationary population about 1960. This stationary condition will persist for a decade or more and may be followed by a decline. In other words, the maximum population of the Nation in the future, unless births or immigrants increase, will be only 15 to 20 per cent greater than at present. This increase, though spread through three decades, is about the same as that during the past decade.

## Consumption Per Person

Consumption of farm products per capita has remained remarkably constant for 30 years at least. In two years during the World War it sank about 4 per cent beneath the level at the beginning of the century (average for 1897-1901), and during two years of urban prosperity, 1926 and 1928, it rose about 6 per cent above this level. During the year 1930, despite the economic depression, consumption of farm products per person was a little above (about 1 per cent) the 1897-1901 level. This variation in per capita consumption is not caused primarily by people's eating more food, on the average, but to a smaller or greater consumption of the more expensive foods, principally meat and milk, with corresponding changes in the less expensive foods, principally the cereals. In view of the rapid approach of a stationary population, unless the immigration restrictions are relaxed, it appears

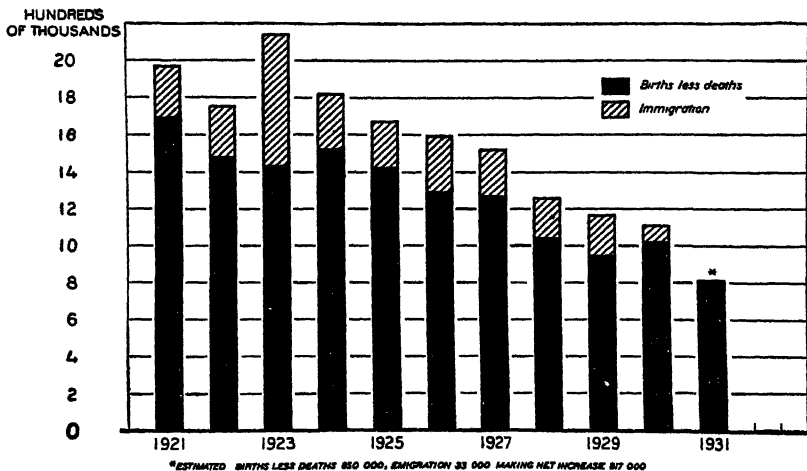


FIGURE 177—Population increase in the United States, 1921-1931. Ten years ago the population of the United States was increasing by nearly 2,000,000 a year. Now the increase is 1,000,000 or less. Births were 2,800,000 or more annually as late as 1925, but by 1931 had fallen to about 2,300,000, while deaths have increased from about 1,300,000 to 1,400,000. Net immigration has been reduced from about 300,000 in 1921 and 1923, and over 700,000 in 1925, to a net loss of more than 70,000 in 1931. A stationary population is approaching with much greater rapidity than anyone surmised five years ago was possible.

unlikely that per capita consumption of farm products will vary much, if any, more in the future than in the past. In other words, total domestic consumption of farm products in the future is likely to depend primarily on population.

## The Trend of Exports

In recent years (since 1927) exports have constituted only about 10 per cent of the value of net agricultural production in the United States and have required about the same percentage of the crop land for their production. (Fig. 178.) This is only about two-thirds as large a proportion as that of a decade earlier. In northwestern Europe, where most of the exports have gone in the past, the birth rate has been declining rapidly, until in most of the countries it will scarcely maintain population permanently; and in England, Germany, and Sweden not enough daughters are being born to replace the

mothers of the present day. On the other hand, agricultural technic is advancing in northern Europe as in North America, and production is increasing.

Moreover, the intensification of the nationalistic spirit which accompanied the World War, and the consequent desire for national security in food supply, brought in, like an undertow, a notable wave of tariff enactments. In Germany the tariff on wheat is \$1.63 a bushel, while in France and Italy, although not so high, it is practically prohibitive. Even Great Britain, the greatest foreign market for American farm products, seems likely to adopt soon a tariff on many farm products. Only to the Orient are exports of farm products increasing.

Whether exports to Europe will increase with recovery from the economic depression, or whether eastern Asia will be able to buy enough farm products in the future to counterbalance the recent de-

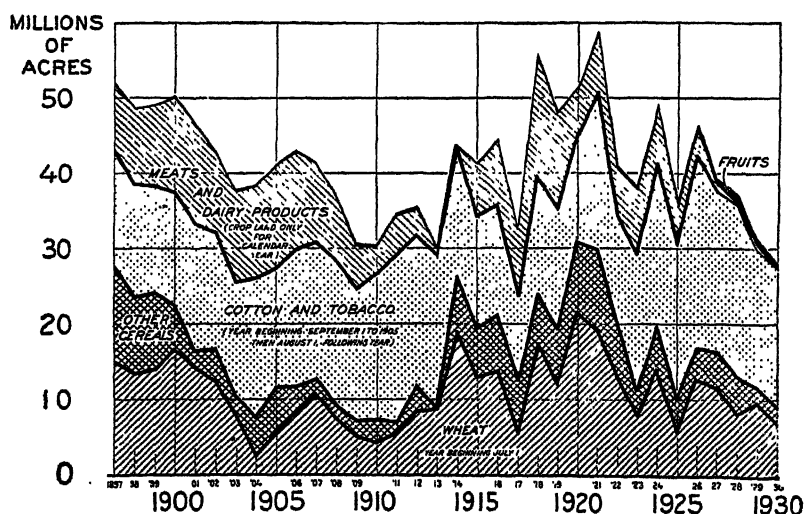


FIGURE 178.—Approximate acreage required to produce net exports of major farm products, 1807-1929. Exports of farm products, as well as number of births and of immigrants, have been trending downward during the last decade. In 1930 the acreage required to produce the agricultural exports was only a little over half that required in the years immediately following the World War, and was lower than at any time since the beginning of the twentieth century.

cline in European purchases the future alone can reveal. It appears unlikely in any case that exports will more than double in the next few years, and the outlook, therefore, is for an increase in demand for farm products varying more or less directly with the population of the United States.

#### Increase of Agricultural Production Per Acre

Since the World War agricultural production per acre has been increased in at least five ways:

(1) By the substitution of gasoline engines for horses and mules. The decline of about 8,400,000 horses and mules on farms, and of probably over 1,000,000 more in cities, between 1918 and 1931, has released nearly 30,000,000 acres of crop land, which has been used mostly to feed meat and milk animals and to produce cotton. This is equivalent to an increase of fully 10 per cent in the effective crop

acreage of the Nation (excludes land required to feed horses and mules).

(2) The increase in animal products (meat, milk, wool, etc., other than power) has been about 23 per cent, whereas crop feed available has increased not more than 10 per cent, while the feed from pasture probably has declined slightly. This increased production of milk and meat per unit of feed consumed, assignable to culling of the cows, slaughter of cattle, sheep, and swine at an earlier age, reduction in death losses, particularly among hogs, a vast shift in pork production from the South to the Northwest, where the stock is better, and many other causes, has probably added the equivalent of 25,000,000 acres to the crop area.

(3) Less important, yet a significant factor, particularly from the standpoint of crop land requirements of the Nation, has been the

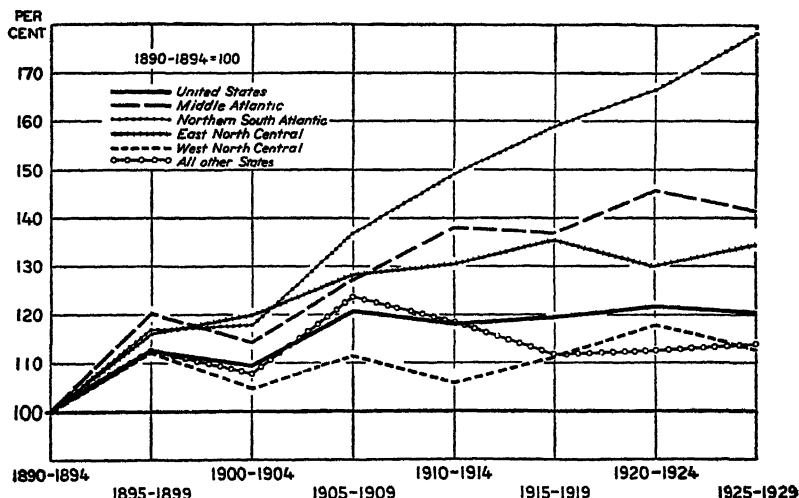


FIGURE 179.—Changes in composite yield per acre for corn, wheat, oats, and potatoes. The trend of acre yields of the crops taken as a whole and in the United States as a whole, has remained stationary for more than 20 years. But in sections of the United States where fertilizers have been extensively used, as in the northern South Atlantic States (North Carolina, Maryland, and Virginia) crop yields have increased greatly. When higher prices of farm products provide farmers with money to buy fertilizers, such increases in acre yields are likely to develop in other portions of the United States

shift from crops less productive per acre to crops more productive; notably in the South, from corn toward cotton, a crop which is worth much more per acre, from wheat toward corn in the North, and from grain and hay toward fruit and vegetables in several areas, notably in California.

(4) Likewise there has been a shift from beef cattle toward dairy cattle, hogs, and chickens, which produce much more food per unit of feed consumed than do beef cattle.

(5) Least important of the ways in which production per acre has been increased since the World War has been an increase in acre yields of a few crops. Totaling the important crops, including fruit, it appears that the average acre yield has remained about stationary since the World War. (Fig. 179.) Indeed, there has been a slight decline in the last three years, doubtless owing largely to adverse weather conditions

Nearly all the increase in agricultural production per acre, therefore, can be assigned to the decline in horses and mules and to improvements in animal husbandry. These two factors alone have added the equivalent of, roughly, 55,000,000 acres, to the effective crop area since the World War. This is an increase of about 18 per cent. It is principally these two new factors which have enabled the total crop acreage to remain almost stationary while agricultural production increased about 20 per cent.

### Prospective Factors in Production

Will these factors that have increased production so greatly on a stationary crop acreage continue to operate even half so effectively during the next decade? And, looking beyond, will these factors provide food and fibers three decades hence for the 15 to 20 per cent increase in population without any increase in the crop acreage? These are questions no person can answer with assurance, but the following facts deserve consideration in reaching a conclusion:

(1) There are less than half enough colts on farms to replace the horses and mules that die yearly. Substitution of tractors and automobiles for horses and mules must continue, therefore, for several years at least. If a successful cotton picker should be introduced, the process, indeed, might be accelerated. The census for 1930 shows over 900,000 tractors on farms April 1 of that year, a greater increase between 1925 and 1930 than between 1920 and 1925.

(2) Culling of dairy cows continues, and undoubtedly can continue with advantage for many decades. Likewise sanitation in hog production and the raising of larger litters will doubtless continue. On the other hand, the gains in utilization of feed assignable to slaughter of cattle and sheep at an earlier age, are not likely to be so important in the future as in the past, for nearly all the slaughter now is of young animals. This factor of increasing efficiency in utilization of feed, therefore, is likely to diminish in importance.

(3) There is much less assurance of a continued shift from the crops less productive per acre toward those more productive per acre.

(4) There is no assurance of continued shift from classes of livestock less productive per unit of feed consumed toward the classes more productive per unit of feed consumed.

(5) Crop yields per acre, on the other hand, if the prices of farm products rise and enable farmers to buy fertilizers, should increase in the future. The possibilities inherent in the use of fertilizers, accompanied by abandonment of poorer fields, are illustrated by the upward trend of crop yields in the northern South Atlantic States (North Carolina, Virginia, Maryland, and Delaware) where the increase in average acre yield in the past 30 years has been about 50 per cent. (Fig. 179, top curve.)

### Soil-Erosion Losses

One other factor deserves consideration, and that is the loss by soil erosion, notably in the South and Southwest. It is estimated by the Bureau of Chemistry and Soils that within 100 years gullying will be well advanced on 100,000,000 acres, unless effective measures of control become widespread. Something like 17,500,000 acres of land formerly cultivated in this country have been destroyed by gullying, or so severely washed that farmers can not afford to attempt their

cultivation or reclamation. Apparently, much of this destruction has occurred during the last decade.

Erosion appears likely, therefore, to reduce materially during the next decade or two the acreage in crops in many parts of the United States. Looking further into the future it appears inevitable that, unless eroding lands can be restored to pasture or forest, or other effective measures of control are promptly instituted, extensive land abandonment will occur in these areas of severe erosion, involving an increase in tax delinquency, slow impoverishment of the communities, with serious social consequences, and eventual extinction of agriculture in the localities. But the area of potentially arable land in the United States is so great that even the loss of most of the crop land now eroding badly, although of extreme importance locally, probably will not seriously affect the trend of agricultural production for the Nation as a whole. Between 1919 and 1929 over 32,000,000 acres of land, mostly east of the Mississippi River, went out of use for crops without any decrease occurring in the Nation's production because as many acres of former pasture land went into crops, largely in the Great Plains States. Indeed, production increased greatly in that decade, despite the stationary crop acreage, principally because of economies in land requirements resulting from the substitution of mechanical for animal power on farms and the more efficient use of feed by meat and milk animals. There are at present about 360,000,000 acres of land in harvested crops in the United States, but there remain probably 600,000,000 acres more that could be used for crops. Of this 600,000,000 acres about one-half, or 300,000,000 acres, require only to be plowed to be put into crops. Nearly all of this land is in farms.

The population prospect, in view of the advances in agricultural technic, leads to the conclusion that the total farm area of the Nation, and probably the crop area also, are not likely to increase much in the future, unless the immigration restrictions are relaxed or unless exports of farm products increase greatly, but that regional shifts in acreage are almost certain to continue. Much eroding land, much hilly land, much other poor land, will revert to forest, brush, or grass or will lie waste; while much level pasture land, principally in the Great Plains area, will be put into crops, and production per acre probably will increase in many parts of the United States on the more fertile, more level, or more favorably located land already in crops.

O. E. BAKER, *Bureau of Agricultural Economics.*

#### NEED OF BETTER DIRECTED LAND SETTLEMENT SHOWN BY MISTAKES OF THE PAST

With approximately 600,000,000 acres of land physically capable of producing crops, but not now so employed, and with an economic need for a comparatively small increase in our net crop acreage the problem of giving direction to agricultural expansion on the basis of the use for which land can best be employed becomes increasingly important.

The agricultural land policy of the Federal Government has consisted in the past, and still consists, largely of making land easily available to the farmer, leaving him free to make his selection, finance the undertaking, and adjust himself to local conditions. Likewise,

with few exceptions, the various States follow the policy of seconding the efforts of private land-selling agencies to attract prospective purchasers of land to the State and of leaving those attracted to the State in the hands of agencies having land for sale. In other words, the traditional public policy in this country has been to promote agricultural expansion without much, if any, regard to the use for which land was best suited, on the general assumption that practically all land which a settler might homestead or purchase was needed for farming purposes. There is now developing a recognition of the desirability of giving better direction to future agricultural expansion—of directing it to those areas having physical and other conditions conducive to the establishment of profitable farming enterprises. Such a program of action will materialize best as part of a more far-reaching program of land utilization.

### Forces Behind Unwise Expansion

The economic history of agriculture has been marked by recurring cycles in which temporary price stimulus led to unwise expansion of farm acreage on lands physically unsuited for farming purposes and on lands with good physical characteristics not economically needed for agricultural use. Concrete evidences of such misdirected expansion are the financially embarrassed and defunct drainage, irrigation, levee, and other improvement enterprises and large numbers of abandoned farms in many parts of the country. The suffering of many communities because large areas of land have reverted to public ownership through nonpayment of taxes, and because numerous families are waging a hopeless battle against natural and economic disadvantages, are other results of overemphasis on the value of land for farming purposes. It is much easier and requires less stimulus to expand farm acreage than to contract it after homes have been established, farm buildings constructed, and time and labor expended in reclaiming land.

Practically all of the land physically capable of producing crops that is not now so employed is held for sale for farming purposes. A survey of the literature used by 1,258 active land-selling companies in the United States and of their practices revealed the fact that while some of these agencies are doing constructive work of a high character, many are operating in ways not in the public interest. On account of the pressure of carrying charges, many land owners are compelled either to allow their lands to revert to public ownership through tax delinquency or to push the sale of land regardless of its suitability for farming. From the point of view of the owner, to sell land under almost any conditions is better than to lose it through tax delinquency. Either a very small down payment or none is required by most agencies included in the survey. Many agencies also encourage prospective purchasers by promises of various types of grubstakes (lumber, one or more head of livestock, employment, etc.).

Almost half (46.7 per cent) of the 1,258 companies included in the survey are engaged in interstate business and slightly more than half of those engaged in interstate business are conducting so-called home-seeker's tours. The far-reaching nature of this interstate business is suggested by the fact that undeveloped and partly developed land in all parts of the United States is held for sale by the comparatively few agencies reached in the survey. (Fig. 180.)

The hunger for owning a farm, the high value many people attach to farm ownership, together with the relative ease of purchasing land, particularly undeveloped land; the general ignorance of prospective farm purchasers about obstacles which must be overcome in order to develop a profitable farming enterprise; and misjudgment or misstatement by various types of land-selling and promotional agencies regarding the physical and economic limitations of land for profitable farming, tend to promote agricultural expansion regardless of whether prices for farm crops are, comparatively, high or low.

In times of stress unemployed city families, particularly those who have had previous farming experience, look to the farm for a means of subsistence. Although there are no nation-wide organizations encouraging the movement of unemployed city workers to the country, there are at the present time committees in some cities endeavoring to

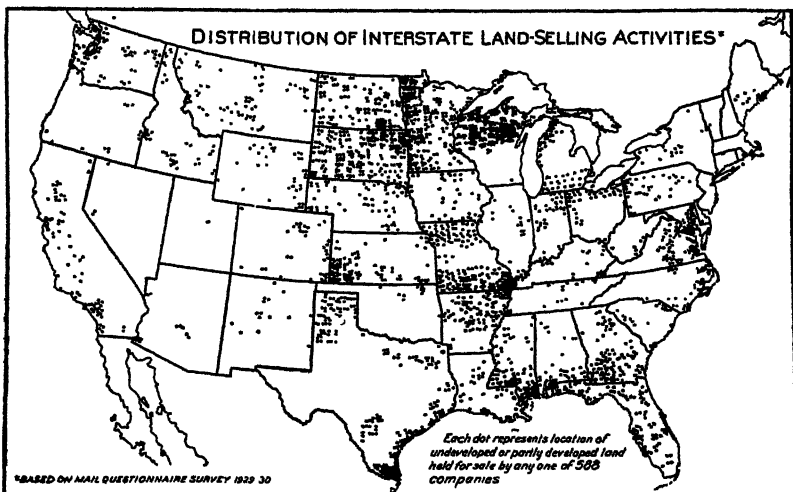


FIGURE 190.—Several land-selling companies endeavor to reach prospective purchasers of land in all but a few States. The majority of companies, however, restrict their activities to some special group of States. All classes of land are held for sale by these agencies, ranging from partly developed farms in what may be considered well-developed agricultural communities to out-overs or other undeveloped land remote from any agricultural development.

help locate unemployed city workers on farms. A large number of jobless families have undoubtedly moved to the country as potential farm owners, regardless of the fact that well-established farmers are experiencing difficulty in maintaining a satisfactory standard of living. Without advice having a sound factual basis many of these new farm families are doomed from the start to failure. Undirected and misdirected settlement has in times past resulted in the loss of economic and human resources, and the chances for loss to-day are as great or greater than ever, because of the limited need for increasing our net crop acreage.

#### Agricultural Expansion Service Agency

No existing public or private agency has adequate information or necessary authority and facilities to furnish prospective farmers, land-selling agencies, various business interests, and other public agencies concerned with the farmer's welfare, sound advice on social and eco-

conomic justification for agricultural expansion in the different regions of the United States. There appears to be need for a service agency to supply unbiased information on the physical and economic adaptability of various classes of land for agricultural development, and thereby to reduce the loss of economic and human resources resulting from attempts to establish farms on lands submarginal for farming purposes. A coordination of the facilities and authority of Federal, State, and even county agencies would be desirable. A central agency of this character could help land-selling companies to develop sound programs for expanding the agricultural area when economically feasible. It could also list and certify developed and partly developed farms for sale or rent and in other ways could be of valuable service to present and prospective landowners, as well as to the public in general. With such an agency developing its program on the basis of careful analysis of the comparative advantages for agricultural development along one or more lines in the competing areas of the United States, many of the difficulties of giving better direction to agricultural expansion will have been overcome.

W. A. HARTMAN, *Bureau of Agricultural Economics.*

## CROPS OCCUPY NEARLY HALF THE CULTIVABLE ACREAGE OF THE UNITED STATES

Of the estimated area of 973,000,000 acres physically capable of use for crops in the United States, 414,000,000 acres or approximately 43 per cent consisted of crop land (land in harvested crops and crop land lying idle or fallow) in 1930. The remaining arable land not used for crops is, on the whole, of lower natural productivity and utility than the crop land now in use. A part, however, is inherently much more productive than some land now used for crops, but in most instances of uncultivated fertile areas, the necessity of draining or clearing has hindered their development, and their inherent productivity may not at present justify the cost of bringing them into production. The marked diversity in quality of the uncultivated potential crop land and the prevalence of low-grade land with poor soil or hilly surface indicate the desirability of competent economic determination of the best use of the land before it is brought under cultivation.

Although the land now used for crops is, on the whole, of better grade than the arable lands not used for crops, considerable bodies of land now cultivated are of such poor quality that they apparently can not provide even a fair living to the operators. In some sections the attempt to farm such land has resulted from the failure to evaluate its capabilities before its development was attempted.

Nearly all the land physically suitable for growing crops is now in private ownership. The unreserved public domain contains little land of value for crop production, mainly because of aridity. Some of our uncultivated arable land consists of pasture or woodland on farms, while some consists of timberland or grazing-land holdings.

If the crop area were expanded to include all land on which crop production is possible, which is altogether unlikely, there would still remain close to 800,000,000 acres available for pasture, about 330,000,000 of which might be used for forest. In 1930 there were approximately 1,350,000,000 acres not used for crops, that could provide

grazing of some sort, but a large part, probably more than four-fifths, was already used for grazing. Any large increase in the land used for pasture will be in the forested or cut-over area. Of the area of forest land of approximately 500,000,000 acres, it has been estimated that there are about 355,000,000 acres suitable only for forest. Under more intensive methods of forest management it is possible that our total requirements for forest products could be supplied from an area equal to that of the land suitable only for forest.

### Small Need for More Crop Land

It is believed by those studying the trend of population and food requirements that little increase in the land used for crops will be needed for many years. (Fig. 181.)

The problems of land utilization are, therefore, less concerned with developing more land to use for crops, than with determining what lands it will be better to use for farming than for some other use under the economic conditions prevailing at any given time, and of coordinating the use of land resources so as to benefit the greatest number of individuals over the longest period of time. In some instances it may involve a change in the use of some land from crop production to some other major use, where the present use seems economically unsound.

The problems involved in the use of farm-land resources have various regional aspects, because of the regional distribution of such resources, and they require regional inventory of resources for intelligent solution.

The broad major rural land-use regions correspond to the great moisture belts. Thus, only in the humid regions does forest constitute an alternative major use. In a large part of the dry Southwest, grazing is the only use where irrigation water is not available. In the Great Plains and probably on the central prairies, crop land and pasture constitute the only feasible major alternative uses.

The humid and subhumid lands of the tall-grass prairies of the Central States are, on the whole, our most productive farm lands, having both favorable topography and naturally fertile soils. Together with the productive, originally timbered lands of the eastern Corn Belt, they are almost all in farms and are likely to remain so. A very large part of the farm area is in crops, and there can be relatively little increase in crop land without a change in the farm organization.

### Problem in Areas of Low Rainfall

In the semiarid and subhumid short-grass plains, however, low rainfall reduces the productivity of inherently fertile soils. The moister lands with smooth surface, where large-scale methods can be used to produce crops at low cost, are very largely in farms, and these are mostly in crops. In the drier parts of this belt there are large areas of physically tillable land on which the yield is so unreliable that crop production is rarely profitable. In addition there are extensive areas in the Great Plains with surface so broken as to be essentially nontillable. Since the Great Plains are treeless, arable land there can be plowed without the cost of clearing. On the arid lands of the West, also treeless, rainfall is as a rule too slight for dry farming. Here,

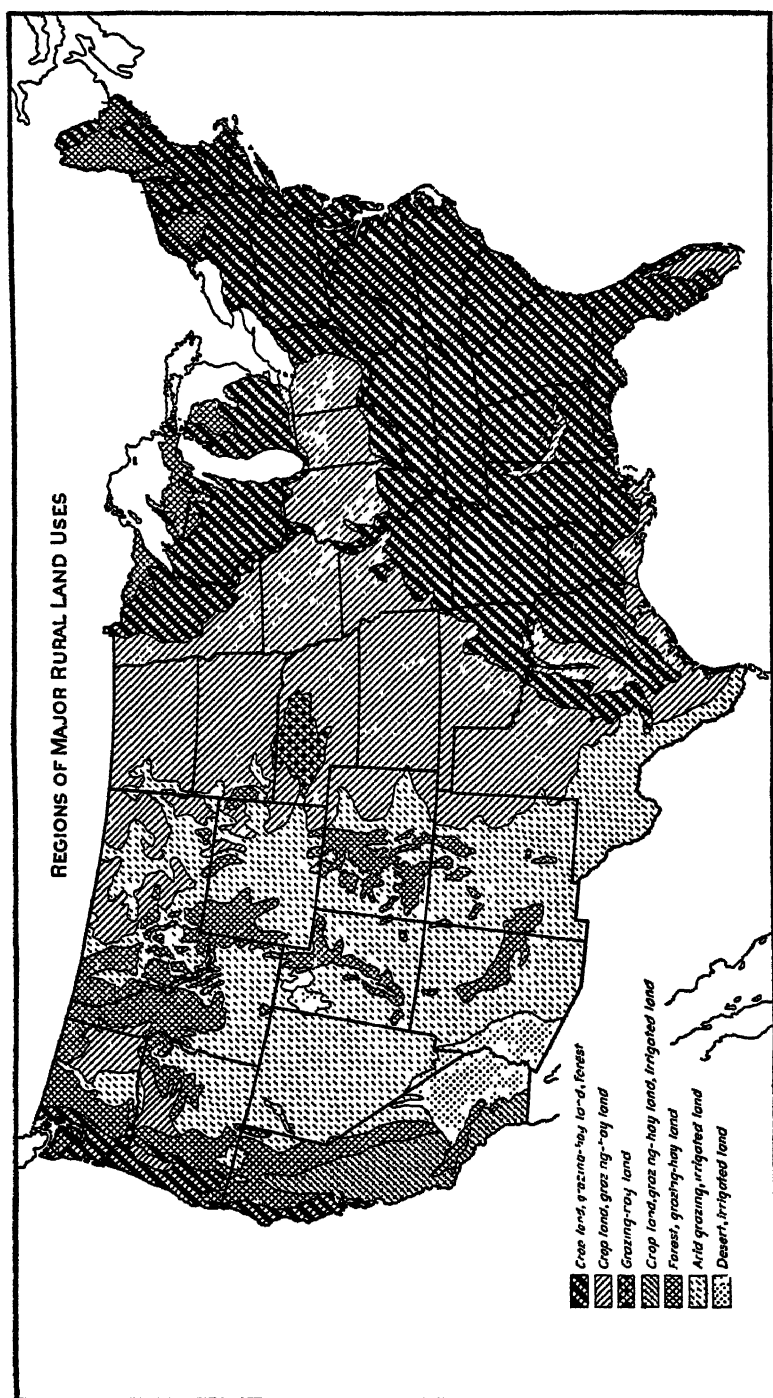
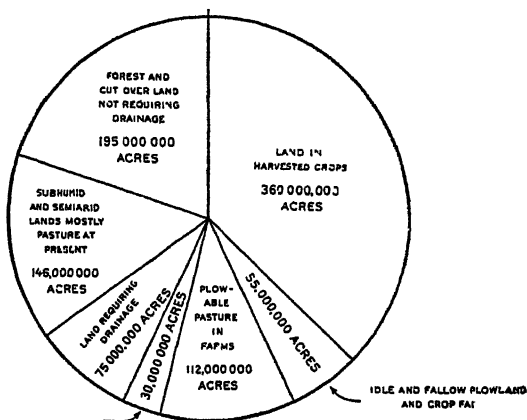


FIGURE 181.—Map showing locations in which different uses of land predominate

except for irrigable areas, the land finds its chief use in furnishing grazing for livestock. It is estimated that, in addition to the land now irrigated, there are 30,000,000 acres potentially irrigable in the arid part of the country. The cost of applying irrigation to most of this would undoubtedly be large, as the most easily irrigable lands have already been utilized.

The great humid forested regions contain large areas of land of various grades of natural productivity, physically capable of crop production. Included within the humid forest regions are a few natural grassland areas not now used for crops, of very favorable topography, but for the most part requiring drainage. Except for certain specialized crops these areas have soils of relatively low or doubtful productivity. Noteworthy among such lands are the great saw-grass swamps or Everglades and the poorly drained prairies or savannas of southern Florida. The uncultivated, poorly drained land with light-colored soils in the coast prairies of Texas and Louisiana are of moderate to low productivity when drained, although the poorly drained dark-colored lands of the coast prairies, much of which is used for extensive grazing, are inherently productive. (Fig. 182.)

LAND CAPABLE OF USE FOR CROPS



EXTREME PHYSICAL POSSIBILITY, 973,000,000 ACRES

FIGURE 182.—Diagram showing proportion of land which is or can be used for crops, under different conditions

### Atlantic and Gulf Coastal Plains

In the Atlantic and Gulf coastal plains are immense areas of forest land with level or gently rolling surface. In large part these are sandy lands. A considerable portion is poorly drained. Further drainage and clearing will be required before this land can be brought into production. Although some of these lands are undoubtedly as productive as a part of those now used for crops, the cost of reclamation and the relatively limited demand for the crops to which they are peculiarly adapted has deterred the clearing of large areas.

In the forested and cut-over country of the northern Lake States, there are large areas of favorable topography, part of which have relatively productive soils, still unused for crops. The short season and low temperatures here limit the range of crops that can successfully be produced. A part of these lands is deficient in drainage, and nearly all must be cleared. In the same region, and rather intimately associated with the more productive lands, are sandy and stony lands

of rather low natural productivity. In bringing new land into use, care must be exercised that the better lands be distinguished from the poorer and settlement guided accordingly. Inventory of soil resources is being carried on in the region to this end.

In northern Maine there are limited areas of productive soil at present densely forested. In the humid forested region of the Pacific Northwest are considerable areas of cultivable land now largely densely forested or covered with stumps, where costs of clearing are very high. Some of this land is moderately productive, while a part is hilly and a part is low in productivity.

#### Uncultivated Land in Humid Forest Region

Although the most productive lands in the humid forest region are, in general, used for crops, this region now contains the largest amount of uncultivated, potentially arable land, the quality of which ranges from high to very low. The wide range in quality necessitates careful discrimination in selecting lands for farming and indicates the desirability of land inventory and the economic classification of land. Particularly in the hilly and stony sections, considerable land is in farms and in cultivated crops, whereas its most advantageous use is probably something other than crop production. Gradual abandonment of such land and its reversion to forest have been taking place. It is probable that eventually there will be some substitution of the better grade lands not now used for crops, for the poorer lands now so used.

There is, further, some reduction in the area of productive farm lands taking place through loss of soil by erosion, both in the humid forest regions and in the subhumid and semiarid grasslands. Gradually a part of the land now in pasture or forest probably will be used to replace some of that land the productivity of which is reduced by erosion or depletion of fertility.

The problems involving the use of land resources are mainly those of wise selection; they require inventory, classification of land according to its most advantageous use, and intelligent planning.

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*Bureau of Agricultural Economics.*

#### AVERAGE VALUE PER ACRE OF FARM REAL ESTATE IN UNITED STATES WAS \$48.52 IN 1930

The average value per acre of farm real estate on April 1, 1930, for the United States as a whole was reported by the Bureau of the Census to be \$48.52. Considerable variation appears in different regions, as a result of varying combinations of physical and economic factors, and several more or less distinct groups of States may be distinguished. (Fig. 183.)

The States reporting the highest acre values are New Jersey, Connecticut, and Massachusetts. These high values reflect the effects of nearness to a concentrated market, and of an ever-expanding demand for locations for suburban homes by increasing numbers of city workers. A more extensive area, where values on the average are somewhat lower, although still appreciably above the United States average, embraces the fertile agricultural area commonly known as the Corn

Belt, and also includes the several States bordering the Great Lakes. The farm lands in this area derive their value principally from their adaptability to agricultural production, although, it is true, certain sections border important industrial and commercial areas.

Farther to the west and southwest are the highly variable land areas of the Mountain and Pacific States. Values range from almost nominal amounts for the poorer-quality grazing lands to several thousands of dollars per acre for lands planted to subtropical fruits. In considering an area so heterogeneous it is easy to understand the high variability between the different State averages, which tend, on the whole, to be lower than the United States average because of the relatively large areas of low-priced land. California and Washington, however, are conspicuous for higher averages, by reason of considerable areas of high-priced lands.

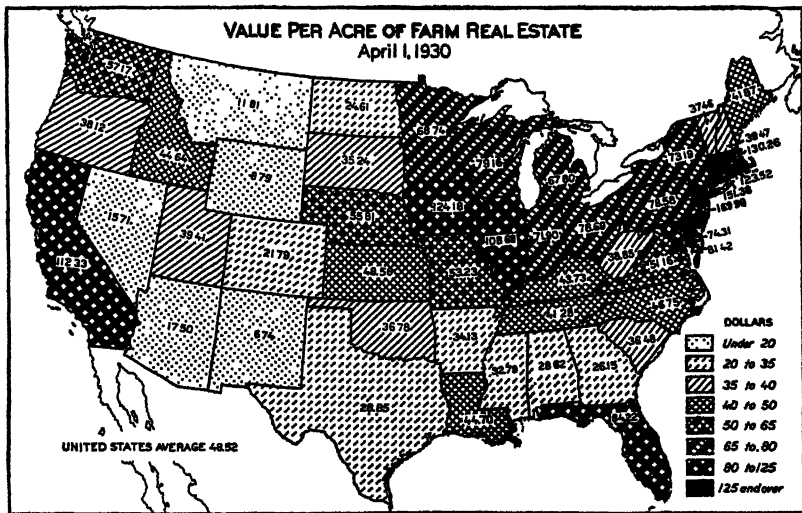


FIGURE 183.—Several generalized areas in the United States may be distinguished on the basis of average value per acre of farm real estate. A few States along the North Atlantic coast report high average values; the Corn Belt and States bordering the Great Lakes constitute a group in which average values, though somewhat lower in general, are appreciably higher than the United States average; the widely varying values in the Rocky Mountain and Pacific States provide many contrasts; and the cotton States bordering the Gulf of Mexico provide a group in which State average values reported are generally lower than the United States average.

The States bordering the Gulf of Mexico, with their great dependence on cotton, average somewhat below the United States average, with the exception of Florida, where the combination of subtropical products and proximity to residential and recreational properties results in a rather high average.

The general relations described above mark the levels of land values in 1930, a decade after 1920, when farm lands for the country taken as a whole reached peak prices. The deflation in the last decade has been exceedingly varied in its effect upon farm real estate in the different agricultural areas. For the country as a whole, the per acre value of farm land and buildings was 30 per cent less in 1930 than in 1920, and by far the great majority of the States report farm real estate values much below those of 1920. Declines in value per acre of farm real estate in the Corn Belt and in the grain-growing areas to the Northwest

and Southwest were very severe. (Fig. 184.) The States in the Cotton Belt, with the exception of South Carolina and Georgia, reported smaller percentage decreases, and one State, Alabama, reported an increase. The Mountain States also reported declines, which, however, showed pronounced variation. Two Pacific Coast States reported declines less than the United States average and the third, California, reported a 7 per cent increase in average value.

### Significance of New England Trend

In the New England and Middle Atlantic States the general trend in value of land and buildings as indicated by the State averages appears to have been upward. That this upward trend reflects a correspond-

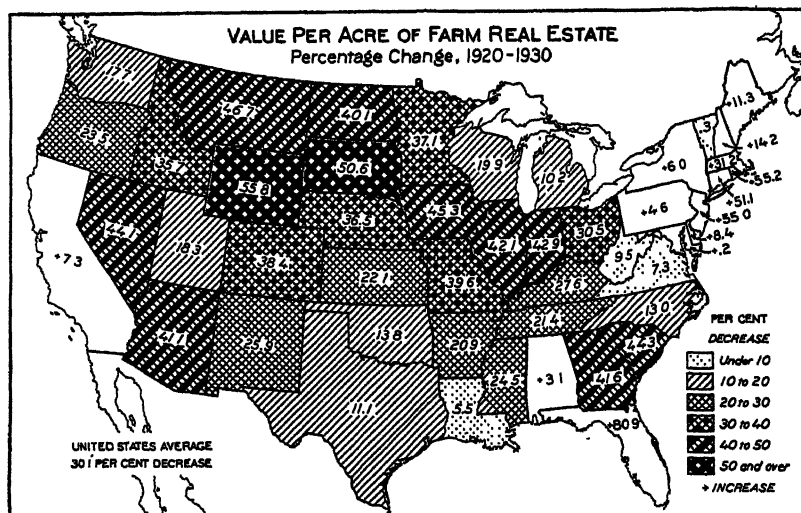


FIGURE 184.—For the United States as a whole, the average value per acre of farm real estate was 30 per cent lower in 1930 than in 1920. Regional changes in values have been far from uniform. The increases indicated by the State averages in several of the North Atlantic States are in contrast to the marked decreases throughout most of the Middle West, the Far West, and substantial portions of the South. State averages do not tell the whole story, however. In New York and Pennsylvania, for example, the greatest increases are, in general, in the eastern portions; many of the western counties in these States report decreases in value.

ing degree of agricultural prosperity in these areas is doubtful, however. It appears more likely that the effects of encroaching suburban developments and recreational uses have resulted in an increased valuation in certain areas more than sufficient to counterbalance declining, or at least more slowly rising, values in some of the strictly agricultural portions of these States. Examples are found in the large increases reported in eastern and southeastern New York, as well as in eastern Pennsylvania and in New Jersey, in contrast to the declines reported in many of the counties in western New York and western Pennsylvania.

It is significant that the States reporting an increase in value per acre from 1920 to 1930 reported an aggregate increase in value of land and buildings amounting to \$270,085,573 accompanied by a decrease of land in farms of 10,286,165 acres. The decrease of land in farms probably represents some degree of farm abandonment or the transition

to forest of part of the less valuable land, together with the absorption of other areas by expanding suburban districts and by various types of recreational usage, especially in parts of New England and New York. The States reporting decreased value per acre, on the other hand, reported an aggregate decrease in value of land and buildings of \$18,707,-816,160, and an increase in land in farms of 41,176,063 acres. The net decrease in value of farm land and buildings in the entire United States (excluding the District of Columbia) was \$18,437,730,587.

### Valuation of Buildings

It will be noted that the changes reported in value per acre of farm real estate relate to value of land and buildings combined. (Fig. 184.) That a considerable part of these increases in value per acre is due to

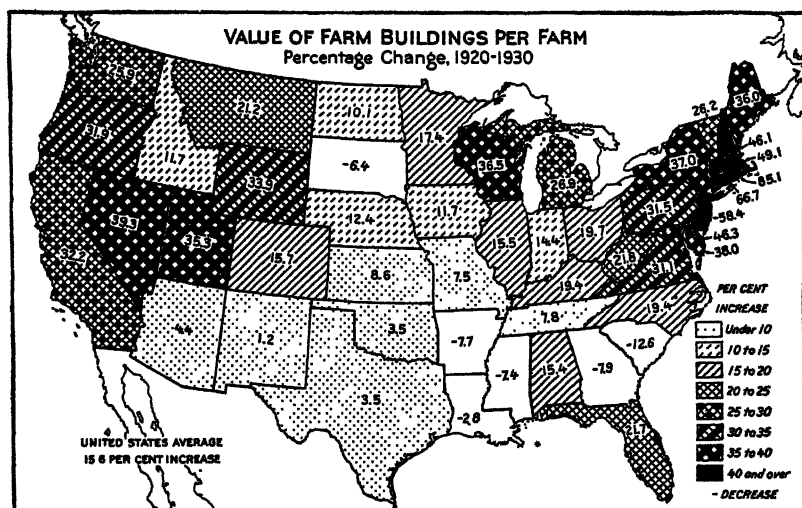


FIGURE 185.—That a substantial part of the reported increases in value per acre of farm real estate (land and buildings combined) is due to reported increases in value of buildings is indicated on the accompanying map. Several New England and Middle Atlantic States, where increases in value per acre appeared, report increases of 30 per cent or more in value of buildings per farm, in contrast not only to the smaller relative increases reported from many of the North Central and Southwestern States, but also to the decreases reported by several of the Southern States.

increased value of buildings, rather than of land alone, is suggested in Figure 185, in which the percentage changes in value of farm buildings per farm from 1920 to 1930 are presented. The average increase for the United States as a whole is 15.6 per cent. The greatest percentage increases are found, in general, in the group of States with both the highest average value per acre of farm real estate, and with the greatest average percentage increases in value per acre during the decade 1920-1930, namely, the southern New England and Middle Atlantic States. Most of the Mid-Western States (Ohio to Kansas and North Dakota) report increases of less than 20 per cent, except Wisconsin and Michigan, where, it will be noticed, smaller percentage decreases in value per acre of land and buildings occurred than in the neighboring States. Several Southern States reported decreases in value of farm buildings per farm, notably Georgia and South Carolina, where, as indicated above, exceptionally large percentage decreases occurred in

value per acre of farm real estate. Alabama, on the other hand, reported a 15 per cent increase in value of buildings per farm, as well as a 3 per cent increase in value per acre of farm real estate.

These trends apparently are related. There is reason to believe that some buildings were included in value of farm buildings, as reported by the 1930 census, that were not included in previous census enumerations. This situation may have arisen as a result of a new inquiry in the census schedule as to value of farmers' dwellings, plantation owners' homes presumably having been included in many cases in 1930, whereas they may previously have been omitted.

On the whole, the result of 10 years of readjustment has brought about a marked reduction in value of farm real estate in a preponderance of the typically agricultural areas. Generally speaking, however, farm realty values in New England, along the Atlantic coast (with a few exceptions), and through the cotton States are higher than in 1910; in parts of the Corn Belt and of the spring-wheat belt values are lower; while in the Mountain and Pacific States the situation is spotted. The extent of the declines from 1920 depends upon a variety of factors which center around the extent to which values in the various areas were inflated in 1920, and in the changes which have occurred in income from agriculture during the past decade.

B. R. STAUBER, *Bureau of Agricultural Economics.*

# FARM DATA IN 1930 CENSUS

## REGIONAL SHIFTS IN CROP ACREAGE SHOWN BY CENSUS HAVE BEEN EXTENSIVE

Despite the agricultural depression, the acreage of crops harvested in the United States as a whole increased materially between the years 1924 and 1929, but in 1931 most of the gain was lost. The census returns recently issued confirm the estimates of the United States Department of Agriculture that an increase of at least 9,000,000 acres occurred between 1924 and 1929; in fact, the census returns indicate an increase of nearly 15,000,000 acres. This discrepancy in figures probably is owing mostly to the fact that the 1925 Census of Agriculture was unaccompanied by a census of population and, therefore, may be less complete than the census of 1920 and that of 1930, which covered crop acreages of 1919 and 1929.

Crop land harvested in 1924 totaled 344,549,267 acres, according to the census, and 359,242,091 acres in 1929, which is an increase of 4 per cent. The crop acreage in 1929 had returned to the 1919 peak, and was, apparently, a little larger than ever before in the Nation's history. In 1930 the area of crops harvested increased another 2,000,000 acres, according to the estimates of the Department of Agriculture, but in 1931 a decrease of over 9,000,000 occurred—the greatest decrease on record, but almost confined to the Dakotas and Montana where severe drought occurred. Total acreage of crops harvested in 1931 was smaller than in any year since 1917, except 1924. It is significant that the total crop acreage of the Nation as a whole has remained more or less stationary for 15 years, despite an increase of 23,000,000 in population, or about 23 per cent. But this stationary national total is the result of great increases in acreage in certain portions of the Nation and of great decreases in other portions.

### Regions of Decrease in Crop Land

The census statistics are tabulated by counties, and maps showing the decrease and increase in crop area between 1924 and 1929 reveal significant regional shifts in acreage. (Figs. 186 and 187.) The decrease in acreage of crops harvested has taken place mostly in a belt which includes nearly all of New England, every county in New York, every county in New Jersey except one, and in Pennsylvania, except three, all counties of eastern Ohio, and nearly all counties in the southern peninsula of Michigan; thence the decrease extends south-

westerly, including nearly every county in southern Indiana and in southern Illinois, also most counties of Missouri, all of southeastern Kansas and the northwestern half of Arkansas, practically all the eastern half of Oklahoma and most counties in central Texas. The decrease in the Chicago district really forms part of this 2,000-mile belt that extends from the Canadian border in Maine to the Mexican border in Texas.

Southeast of this belt less notable decreases in crop acreage occurred in most counties of Tennessee and South Carolina, also in about half the counties of Florida, Georgia, North Carolina, Virginia, West Virginia, and Kentucky and in more than half the counties of Maryland and Delaware. Georgia, South Carolina, Kentucky, and to a less extent all the Southern States, except Texas, suffered drastic declines in crop acreage during the previous 5-year period, 1919-1924, and a

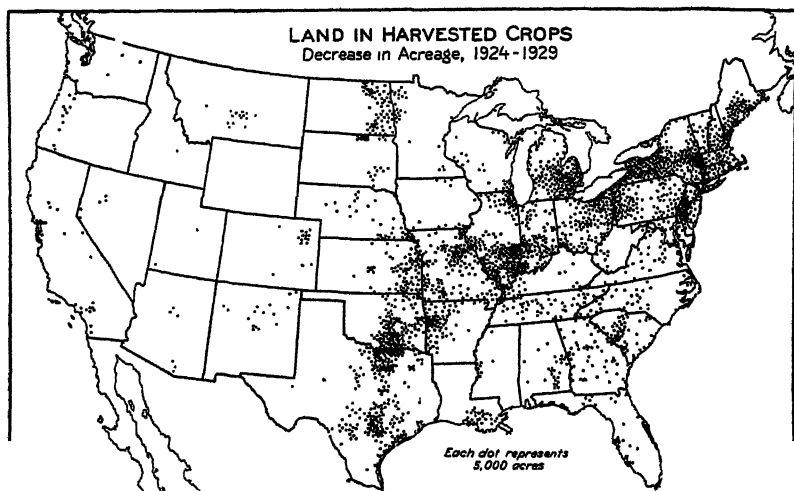


FIGURE 186.—The decrease of land in harvested crops between 1924 and 1929 occurred principally in a belt that extended from New England across New York and Pennsylvania, eastern Ohio and southern Michigan, southern Indiana and Illinois, to eastern Oklahoma and central Texas

recovery in some of the counties of this region was to be expected. (Fig. 188). In most of Indiana, Ohio, and southern Michigan, however, crop acreage also declined greatly between 1919 and 1924, and this decline has continued into the period 1924-1929. On the other hand, in New England and New York crop acreage declined little between 1919 and 1924 and in many counties increased. (Fig. 189.)

Minor areas of decrease in crop acreage between 1924 and 1929 are the "sugar bowl" of southeastern Louisiana, the eastern third of North Dakota and adjacent counties in northwestern Minnesota, the upper Yellowstone and Musselshell Valleys in Montana, western Oregon, and northern New Mexico. (Fig. 186.)

#### Regions of Increase in Crop Land

In nearly all other parts of the United States an increase in crop acreage occurred. (Fig. 187.) This increase was notable in the Great Plains area that extends from west-central Texas to the Canadian

border and beyond. Particularly heavy was the increase in the Panhandle of Texas and in the western parts of Oklahoma, Kansas, Nebraska, South Dakota, and North Dakota, also in northeastern

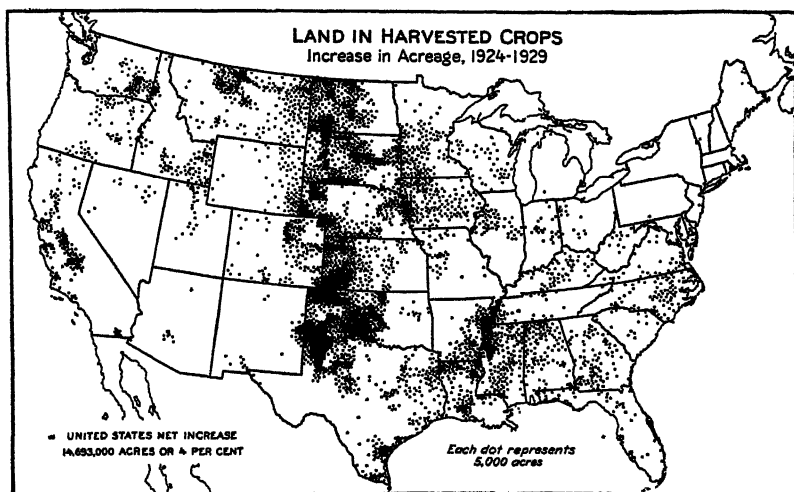


FIGURE 187.—The increase of land in harvested crops between 1924 and 1929, principally in the Great Plains area, Minnesota and Iowa, and in the Yazoo-Mississippi Delta, extending eastward into Alabama, exceeded the decrease in area by nearly 15,000,000 acres. (Fig. 188)

Montana and the Great Falls-Havre-Shelby triangle. This belt of increase, less heavy, extended eastward across Iowa and most of Minnesota into Wisconsin and central Illinois.

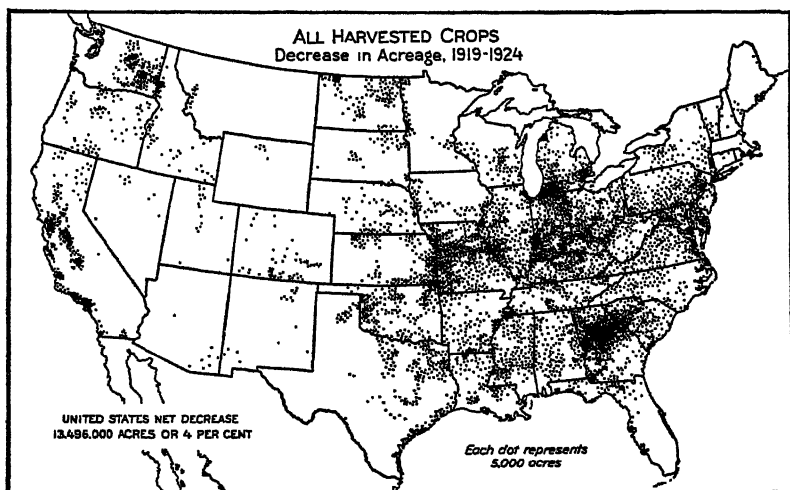


FIGURE 188.—In the period immediately following the World War, 1919-1924, the decrease in acreage of harvested crops was most notable in Kentucky, Ohio, Indiana, and southern Michigan, in central Missouri, and in the piedmont of Georgia and South Carolina. This decrease exceeded the increase, mostly in the Great Plains area, by about 13,500,000 acres

Smaller increases occurred in nearly all the counties from the Great Plains to the Pacific Ocean, except in northern New Mexico, western Oregon and several dominantly urban counties of California. Three

areas of increase in crop acreage in the East also deserve notice:

- (1) The Mississippi River bottom lands from Missouri southward to the sugar-growing parishes of Louisiana, and also the coastal-prairie rice district. Reaction from the decline in crop acreage after the World War appears to have spread from these Mississippi River bottoms eastward almost to Georgia and westward into eastern Texas.
- (2) The southern tip of Texas, notably around Corpus Christi.
- (3) The coastal plain of eastern North Carolina and southeastern Virginia. This increase is attributable, in part, to the fairly favorable prices for cotton prior to 1929.

In Figure 190 the decrease and increase in the decade 1919-1929 is shown by States. It will be noted that crop acreage decreased in every State east of the Mississippi River, except Mississippi, while in all the States west of that river crop acreage increased, except in

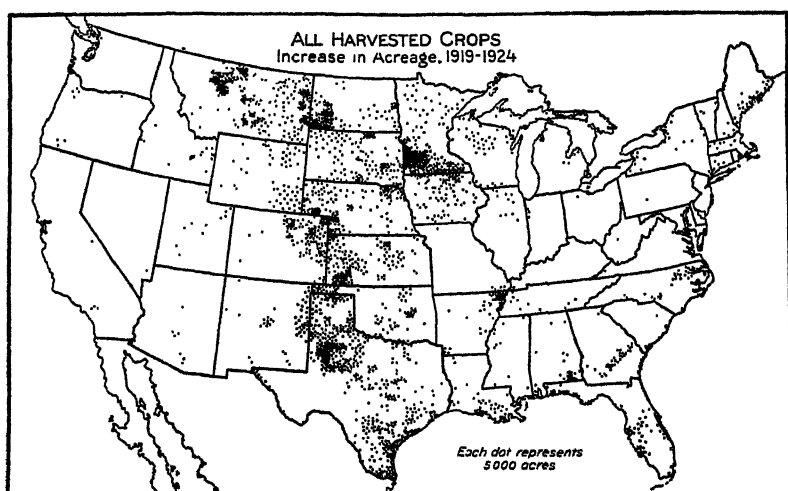


FIGURE 189.—The increase in acreage of harvested crops between 1919 and 1924 was almost confined to the Great Plains area, southern Minnesota and southern Texas, with a small area of recently drained land put into crops in southeastern Missouri and adjacent Arkansas

Missouri, Arkansas, and the three Pacific Coast States. When the decreases are tabulated for all the counties in which a decrease occurred, nearly all located in the originally forested portions of the United States, it appears that over 32,000,000 acres of land that were in crops harvested in 1919 lay idle in 1929, or were used for pasture, or were growing up to forest; while 33,000,000 acres, mostly in the originally grassland portions of the Nation, that were used largely for grazing in 1919, had been plowed and put into crops by 1929.

#### Conditions Associated With Changes in Crop Land

Viewing the United States as a whole, a few conditions appear to be associated with most of these notable decreases and increases in crop acreage. The decreases have occurred principally in areas:

- (1) Where the soil was rather poor to begin with, or where sale of crops and animal products for many years without use of fertilizers has resulted in depletion of soil fertility, or where cultivation of sloping land has caused loss of fertility by erosion. Of these factors probably erosion is the most important.

(2) Where the surface of the land is too hilly or stony, or where the farms are too small to permit the efficient use of modern machinery.

(3) Where industrial or commercial opportunities in near-by cities have attracted the young people from the farms, or where suburban development has transformed farms into residential sites, golf courses, or idle land.

The large increase in crop acreage in the Great Plains area has occurred mostly in areas having—(1) fertile, virgin, grassland soils, unleached by heavy rainfall, and productive in seasons of normal and supernormal rainfall; also practically uninjured by erosion, owing largely to previous vegetation cover; (2) almost level land adapted to use of large-scale machinery; and (3) farms large enough to afford opportunities normally commensurate with those in the cities.

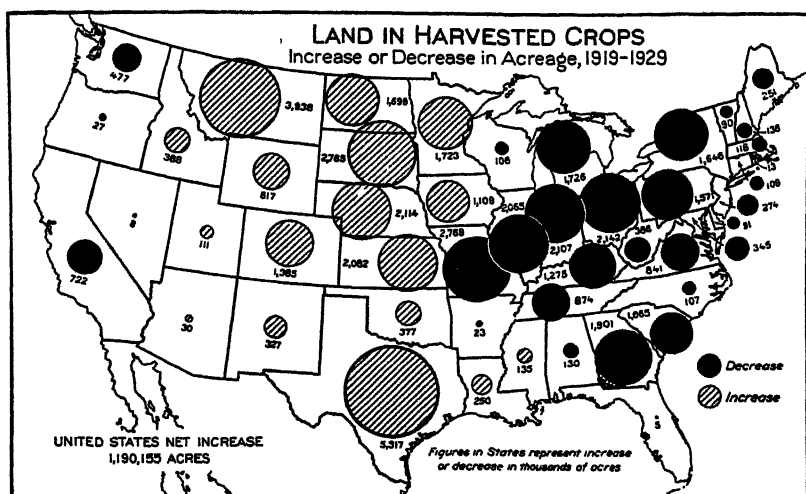


FIGURE 190.—Considering the regional changes in crop acreage for the decade 1919 to 1929 as a whole, and by States only, it appears that in every State east of the Mississippi River, except Mississippi, a decrease occurred; while in every State west of that river, except Missouri, Arkansas, and the Pacific Coast States, an increase occurred. The decrease was notable in the States extending from New York to Missouri, also in Georgia and South Carolina, while increase was equally notable in the Great Plains area, extending from Texas to Montana, also in Minnesota, and, to a lesser extent, in Iowa.

Some of these factors also help to explain the increase in crop acreage in the Mississippi River bottoms and in many of the valleys of the 11 Western States.

It is evident that progress in the use of the tractor, the combine, and other large-scale machinery in the West has continued to promote expansion of crop acreage and this has continued to exert a depressing effect upon eastern agriculture. Since the census was taken this depression, owing to the great fall in prices of farm products, has extended in severe form into the West also, and it seems not unlikely that, if present unfavorable conditions continue, the expansion of crop acreage in the Great Plains and other western areas will slow up, possibly cease entirely, for a while. But contraction in acreage in the West, as in much of the East, will come slowly, if at all, because the farmer has the equipment and labor to operate the land, and taxes and interest payments have to be made.

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## REGIONAL SHIFTS LARGE IN MAJOR CROP ACREAGES DURING DECADE 1919-1929

The decade 1919 to 1929 witnessed a decline in crop acreage in the area lying east of the Mississippi River, which was more than offset by an increase west of that river. Much of the decline east of the river resulted from abandonment of farms or conversion of farm land to urban or semirurban use. A further cause of decline was the replacement of low-yielding acreages, particularly hay, by smaller acreages of higher-yielding crops or kinds of hay. Much of the increase west of the river resulted from the breaking up of new lands in the semihumid portions of the Great Plains States for cultivation under more modernized machine methods. A portion of the increase must also be attributed to the difference in the two crop seasons. In 1919, a severe drought over much of the western portion caused a heavy

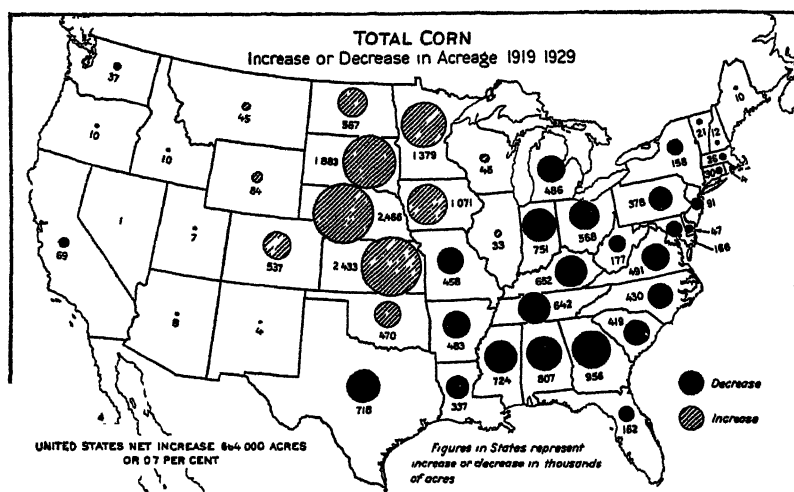


FIGURE 191.—Reductions in corn acreages east of the Mississippi River from 1919 to 1929 were slightly more than offset by increases west of the river, where corn and hogs, displaced much war-time wheat

abandonment of crops. In 1929, on the other hand, a favorable growing season was accompanied by less than average abandonment. Certain regional changes in individual crop acreage result from readjustments of price levels. The year 1919 followed a year of very high prices for cash crops, while 1929 followed a year of relatively low prices.

The acreage of corn in the United States in 1929 was larger than the acreage in 1919 by about 664,000 acres, or 0.7 per cent. The exact change can not be determined, since in the census for 1929 acreage of corn for all purposes was enumerated, while in the census for 1919 the separate acreage of corn "for grain" and "for forage," and of all crops "for silage" and "for grazing" were enumerated. The extent of possible duplication can not be accurately determined. It can readily be seen from Figure 191, however, that a general decrease in acreage occurred east of the Mississippi River and in Missouri, Arkansas, Louisiana, and Texas. A very pronounced increase from Minnesota and North Dakota south to Kansas and Colorado took

place. The decline in corn acreage east of the Mississippi River was coincident with the general decline in crop acreages in this area. The expansion west of the river accompanied the expansion of the hog industry in that area, particularly in the more humid sections of these States, which are adapted to corn growing. In Iowa, the southern portion of Minnesota, and the eastern portions of South Dakota, Nebraska, and Kansas, wheat acreage was greatly expanded under war-time stimulus. Since 1919 corn and hogs have been more profitable under relative price conditions than has the growing of wheat. (Fig. 191.)

Wheat acreage in 1919 was still on a high plane brought about by war-time stimulus. By 1929 the acreage in the United States had decreased by over 11,000,000 acres. East of the Mississippi River and in Missouri, where total crop acreage declined, wheat acreage in addition returned to a normal proportion of the total crop acreage.

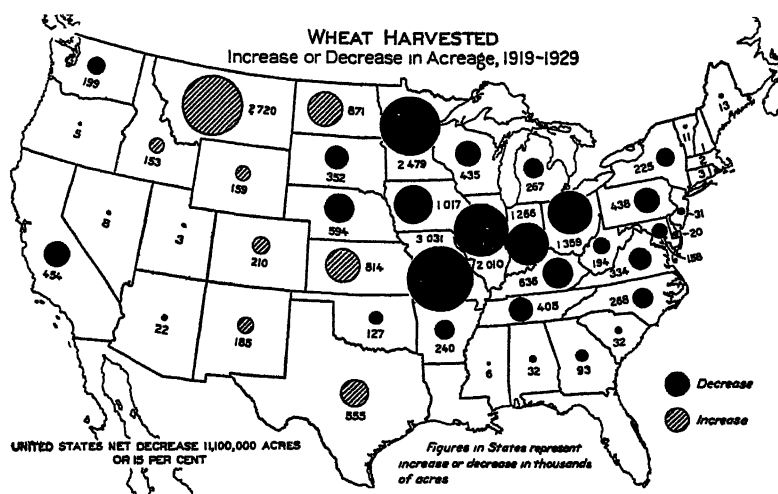


FIGURE 192 — Between 1919 and 1929 wheat acreage from Missouri eastward returned toward its normal proportion of the cropped acreage, from eastern Kansas northward it was partially displaced by corn and barley, and from western Texas and New Mexico northward, new lands were opened up for wheat growing

In Iowa and the southern portion of Minnesota and in the eastern portions of South Dakota, Nebraska, and Kansas, wheat acreage was displaced by corn, as mentioned in the preceding paragraph, and also by barley. In the western parts of the Dakotas, Nebraska, Oklahoma, and Kansas, and in the Mountain States from Montana to New Mexico, new land was broken up for wheat growing as a result of large-scale farming with tractors and combines. A part of the increase in North Dakota and Montana represents also a recovery from the extensive abandonment of wheat in 1919. (Fig. 192.)

The census data on cotton acreage show an increase of 9,500,000 acres or 28 per cent, from 1919 to 1929. Decreases shown in Georgia and South Carolina result from the precipitous decline in cotton acreage following three years of heavy loss from boll-weevil damage in 1921-1923. As a result of the short crops in these years, cotton was displaced in some parts by peanuts and other legumes, and in some parts farm land went out of cultivation entirely. In these States, acreage had not

returned to pre-weevil levels by 1929. In Alabama and parts of Mississippi, Louisiana, Arkansas, and Texas, acreages in 1919 were on a low level because of a series of weevil-damaged crops in 1916-1918. The increase to 1929 in this area represents a partial return to former acreage levels. In the Delta portions of Arkansas, Louisiana, and Mississippi, an upward trend in Delta cotton land has gone forward during the decade with new Delta land broken for cotton or diverted from corn and other crops. In Oklahoma and Texas the tremendous increase in acreage has come largely since 1924 in southwestern Oklahoma and northwestern Texas, where cotton is now produced on semi-humid lands formerly in range and considered unproductive of this or any other cultivated crop. (Fig. 193.)

Oat acreage for grain declined over 1,000,000 acres or about 11 per cent, from 1919 to 1929. The decrease was rather general throughout

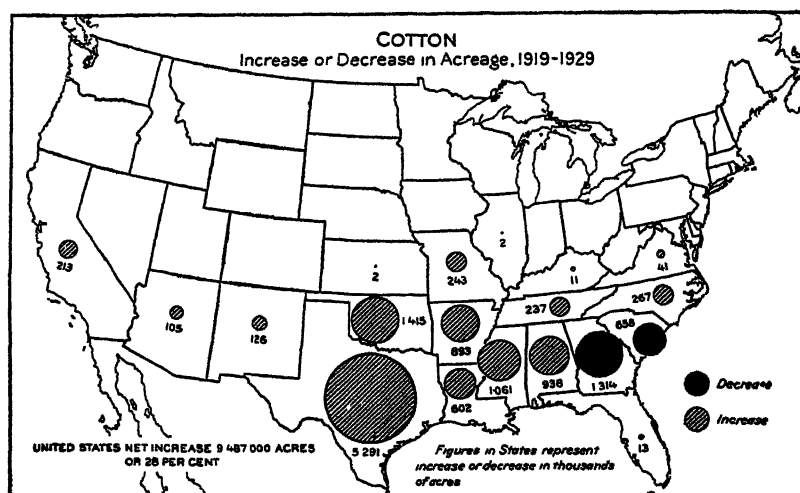


FIGURE 193.—Higher levels of cotton acreage now prevail in western Texas and Oklahoma where ranges were broken up, and in the Delta of the Mississippi River where high yields per acre are obtained. Lower levels prevail in Georgia and South Carolina where heavy weevil damage in 1921-1923 drove farmers out of cotton.

the country, except in Minnesota, Iowa, and Nebraska, where substantial increases were made. The decreased acreage reflects decreased work-stock numbers. In the Minnesota-Iowa-Nebraska area, oats are another feed crop increased with the increasing livestock industry in these States. A part of the decrease in acreage harvested for grain is offset by an increased use of oats as "bundle" feed and as a part of "mixed grain," the exact change in acreage of which is not determinable from census data.

### Increase in Barley Acreage

Barley acreage in the United States increased over 6,000,000 acres or nearly 100 per cent, during the decade. The increase has been general except in the Northeast, and has been particularly marked from Illinois and Wisconsin westward to Idaho and southwestward to northwestern Texas and Colorado. Many States in this area doubled or even quadrupled the acreage of barley. The regional shift has been

away from wheat and oats and is another phase of the expansion of the hog industry westward from the Mississippi River.

The acreage of rye declined from a war-time peak of over 7,600,000 acres to 3,000,000 in 1929. The decrease was general, but was most marked in New York and Michigan where the reduction was over 80 per cent and in North Dakota where it was over 60 per cent.

The acreage of tame hay in the United States decreased from 55,600,000 to 54,300,000, or about 3 per cent. The decrease in acreage has been more than offset by shifts to higher-yielding kinds like alfalfa. The North Atlantic and Southern States, Ohio, and Indiana are producing less hay, while the States growing in importance in dairying, beef cattle, and sheep production, from Michigan west to Montana and southwestward to California are increasing hay production. Cultural difficulties in the production of alfalfa have led to a severe downward trend in hay acreage in Nebraska and Kansas.

The decrease in the acreage of wild hay during the decade, from 17,000,000 acres to 13,500,000 acres, reflects the breaking up of land in the Great Plains States for the growing of wheat, flax, and barley, and also the further draining of lowlands in a number of the North Central States.

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## FARMS FEWER BUT LARGER IN 1930 THAN IN 1920; CROP AREA PER FARM INCREASED

Changes in total numbers of farms reflect only to a minor extent the severe competition in farming that prevailed throughout the decade 1920-1930. There were 6,288,648 farms in 1930, according to the census, as compared with 6,448,343 farms in 1920. This is a decrease of less than 3 per cent. The amount of land in farms, 986,771,016 acres, in 1930 was approximately 31,000,000 acres more than the 1920 figure. The average size of farms increased to 157 acres in 1930 from 148 acres in 1920. Land in crops harvested averaged 57 acres per farm in 1929 and 56 acres in 1919.

Decreases in numbers of eastern farms were widespread partly because production per man is generally less in the East than on the larger, more level, and frequently more fertile farms of the West; also because of the relative nearness of eastern farms to urban centers of employment. (Fig. 194.) Indeed, the number of farms decreased in all States east of the Mississippi River, except North Carolina, Florida, Alabama, and Mississippi, but west of that river decreased only in Missouri, Montana, and Idaho. In all of the New England States, in New York, New Jersey, Pennsylvania, Ohio, Indiana, Michigan, Montana, South Carolina, and Georgia, numbers of farms decreased over 10 per cent between 1920 and 1930.

Decreases in numbers of Montana farms were sharp, following a number of years of drought so severe as to convince many newly settled farmers that they had been mistaken about the climate and the amount of land and capital required to farm in that State. Much of the land they left is now consolidated into larger farms so handled as to increase the production per man and to improve the competitive position of the remaining farmers.

In extensive areas in South Carolina and Georgia, particularly in the lower piedmont of those States, boll-weevil damage and other factors made cotton farming very hazardous, and forced many farmers to seek a living elsewhere. Much of the land they left is no longer farmed. Many of the 228 counties of the United States in which numbers of farms decreased 25 per cent or more between 1920 and 1930 are in these two States. Montana and the New England States have many others, but only a few of these counties of large decrease are in the central part of the country. In three piedmont counties of Georgia there were less than half as many farms in 1930 as there were in 1920. Most of the other 16 counties with less than half as many farms in 1930 are near large cities or contain them.

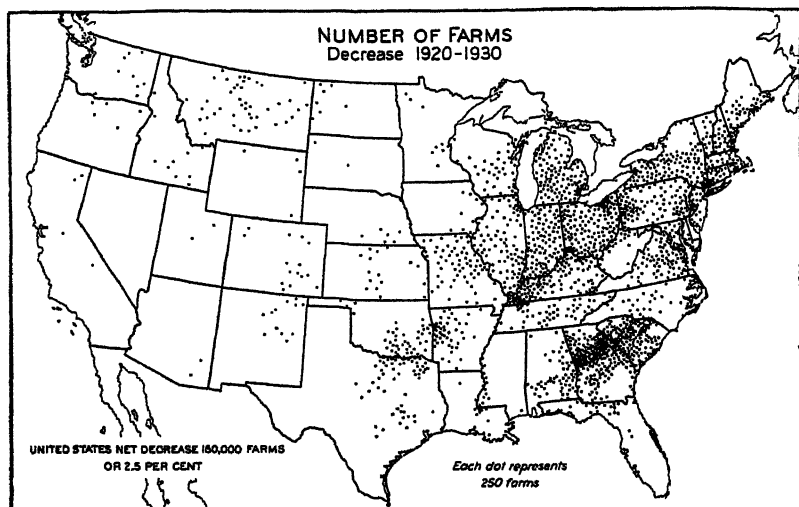


FIGURE 194.—The decrease in number of farms was notable in South Carolina, Georgia, and eastern Alabama, where much land went out of use for farming. A smaller decrease may be noted quite generally over the New England, Middle Atlantic, and East North Central States. There has been a trend toward consolidation of farms in the eastern Corn Belt and in the northern Plains. This trend was aided in Montana by several dry years which forced many recent homesteaders to leave their farms. The decrease in number of farms was greater than the increase, the net decrease for the United States being 150,000, or 2.5 per cent.

### The Western Cotton Area

Cotton production has been less hazardous and the morale of cotton farmers has been better maintained in the remaining cotton States, resulting in generally increased acreages of crops and in numbers of farmers. (Fig. 195.) The feasibility of cotton production in western Texas became widely appreciated, resulting in a phenomenal increase in numbers of farms there. South Texas, along with Florida and California, also gained greatly in numbers of farms as a result of the widened market for fresh fruits and vegetables. Of the 314 counties of the United States in which the number of farms in 1930 was greater than the number in 1920 by 25 per cent or more, 109 are Texas counties. Of the 45 counties in the country in which numbers of farms at least doubled, 34 are Texas counties.

Numbers of farms increased 10 per cent or more between 1920 and 1930 only in Arizona, Louisiana, California, Mississippi, and Texas, named in order of the percentage increase in each. Four of these five

States outranked all others in gains in numbers of farms. Between 1920 and 1930 Texas gained 59,456 farms, Mississippi 40,562, Louisiana 25,982, and California 18,006 farms.

### Changes in Numbers of Farms by Size

Decreases in numbers of farms have been most general in a size group long regarded as somewhat ideal, farms of 100 to 174 acres, and increases in numbers have been most general in a size group long regarded as too small to provide a livelihood—farms of less than 3 acres. (Fig. 196.)

The number of farms under 3 acres more than doubled between 1920 and 1930, but even in 1930 these were less than 1 per cent of the total number of farms. Farms under 20 acres in size constituted 12 per cent of all farms in 1920 and 15 per cent of all farms in 1930. Farms on which cotton is grown are, in general, relatively small, and changes in cotton acreages have a marked effect on numbers of farms, particularly

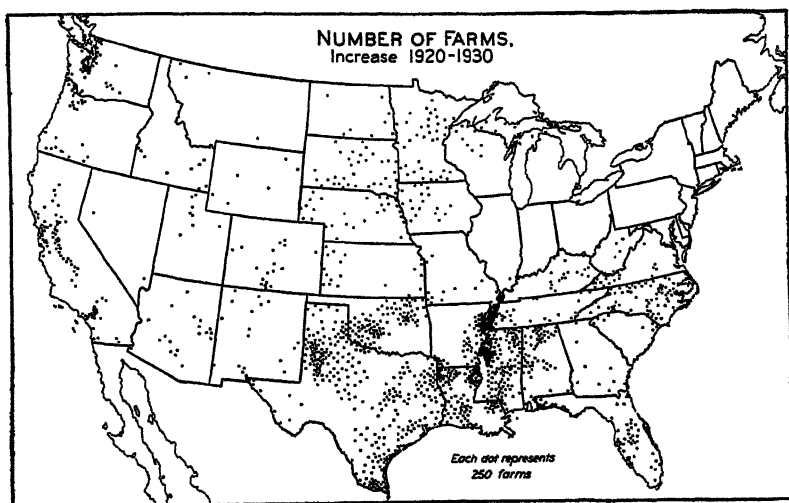


FIGURE 193.—The increase in number of farms between 1920 and 1930 occurred principally in the central and western portions of the Cotton Belt, in North Carolina, in central Florida, in Minnesota, and South Dakota, and in the valleys of the Pacific coast region

numbers of farms of the smaller sizes. The five cotton-growing States of Mississippi, Arkansas, Louisiana, Oklahoma, and Texas between them had about 83,000 more farms under 20 acres in size in 1930 than they had in 1920. The increase in numbers of farms of this size was about 120,000 for the country as a whole.

### Changes in Five Size Groups

The great bulk of the farms of the country, 84 per cent in 1920, 81 per cent in 1930, are farms of between 20 and 500 acres. In all five size groups into which farms between these limits are divided by the census, the number of farms decreased in the country as a whole. However, in every size group, numbers of farms increased in some of the States. Farms of 20 to 49 acres, and farms of 50 to 99 acres, increased in number in most States in which the total acreage in farms increased, in some cotton-growing States in which total acreage in farms de-

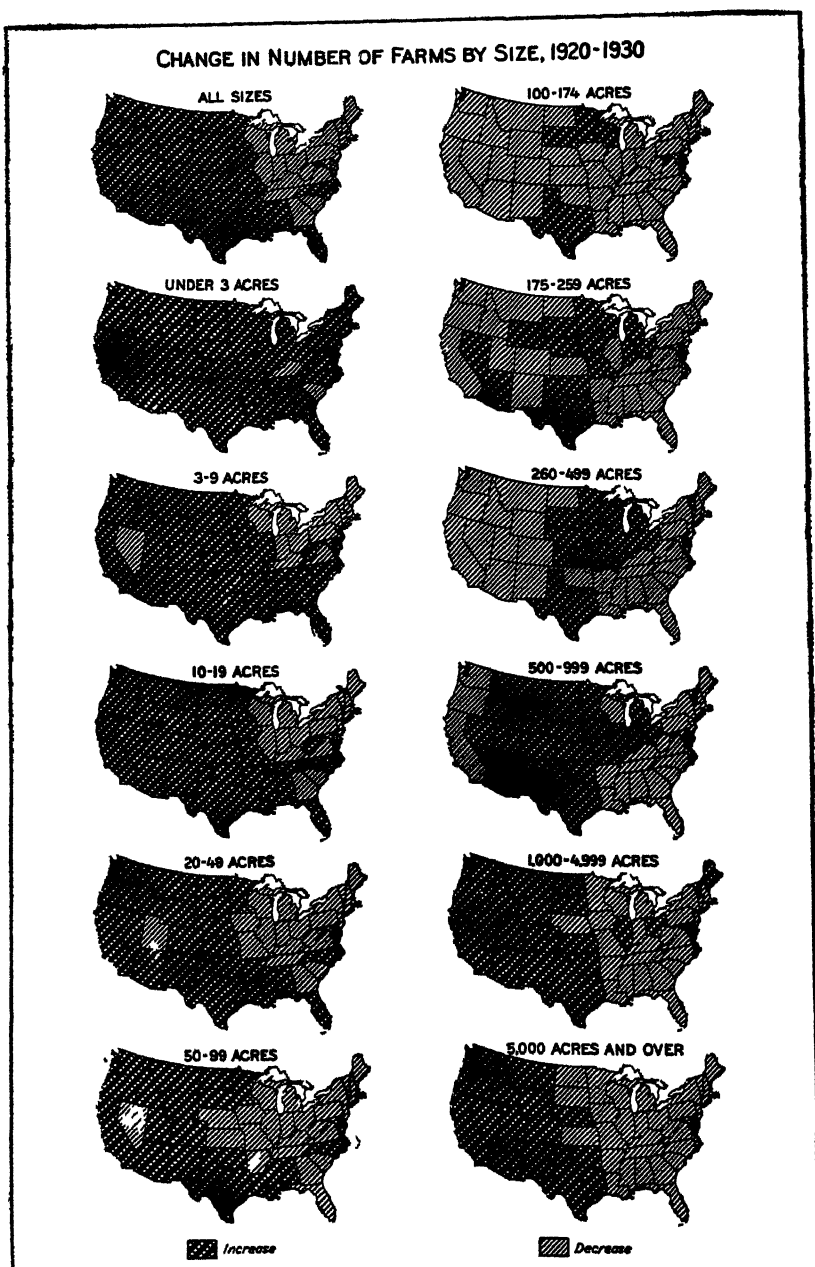


FIGURE 196—The increased numbers of farms in most of the groups of medium large to large size occurring in the Central and Western States, 1920-1930, may be attributed in part to an expansion in acreage in farms and in part to combinations of farms of smaller size made desirable by increased mechanization. The increase in number of small farms has occurred in connection with increased specialization, an increase in the amount of part-time farming and, in most of the cotton-growing States, to an increase in the cotton acreage

creased, but nowhere else. Farms 100 to 174 acres in size increased in number only in Wisconsin, Minnesota, South Dakota, and Texas.

Numbers of farms in the size groups, 175 to 259 acres, 260 to 499 acres, 500 to 999 acres, 1,000 to 4,999 acres, and 5,000 acres and over, increased in at least half of the States, relatively few of which are east of the Mississippi River. In Delaware, Ohio, and Illinois, however, numbers of farms of 260 to 499 acres, 500 to 999 acres, and 1,000 to 4,999 acres, increased. In the Mountain States the expansion in total farm acreage occurring in each State and the acreage released as a result of decreased numbers of farms of 100 to 499 acres, was absorbed by the increased numbers of farms of less than 100 acres and of 500 acres and over. The situation was similar in all three Pacific States except that in them farms of 500 to 999 acres decreased in number also.

Because of the varying importance of farms of different sizes in different parts of the country, and because farms of every size increased in number in some States and decreased in other States, a statement of the degree of change in numbers of farms of any given size can have no great value, taking the country as a whole. With this caution it may be said that numbers of farms under 20 acres in size increased 15 per cent in the United States between 1920 and 1930 while farms of 20 to 49 acres decreased 4 per cent, farms of 50 to 99 acres decreased 7 per cent, farms of 100 to 174 acres decreased 7 per cent, farms of 175 to 259 acres decreased 2 per cent, farms of 260 to 499 acres decreased 5 per cent, farms of 500 to 999 acres increased 7 per cent, farms of 1,000 to 4,999 acres increased 19 per cent, and farms of 5,000 acres and over increased in number 26 per cent.

There is a general interest in large farms because of the increasing extent to which farming is being mechanized. In 1930 there were 9,299 farms of 5,000 acres and over as compared with 7,385 in 1920. These large farms increased in number only in the western half of the country, however, specifically in Nebraska, Oklahoma, Texas, and in the 11 States of the Mountain and Pacific divisions. These States include all but five States in which the total acreage in farms increased between 1920 and 1930.

Most of the largest farms are cattle ranches. Texas had 30 per cent of all the farms of 5,000 acres and over in 1930, Montana and New Mexico each had 10 per cent, California and Wyoming each had 8 per cent. Less than 3 per cent of the land area in farms of 5,000 acres and over was in harvested crops in 1929, as compared with 20 per cent in the farms of 1,000 to 4,999 acres, 27 per cent in the farms of 500 to 999 acres, and 48 per cent of the land area in farms of less than 500 acres. These large farms have not greatly affected the profits from crops grown on smaller farms. Of the total crop land harvested in 1929 in the United States less than 1 per cent was on farms of 5,000 acres and more as compared with 81 per cent harvested on farms of less than 500 acres.

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#### FARM TENANCY INCREASED FROM 38.1 PER CENT OF ALL FARMS IN 1920 TO 42.4 PER CENT IN 1930

During the period 1920 to 1930 an unusual number of farmers in all sections of the United States changed their tenure relationship to the land. In spite of the low prices for farm products, some farmers have paid for farms and others have made substantial progress toward

ownership. Contrasted with these are many who were owners in 1920 but who are tenants now.

The net result of the changes in tenure of the individuals is a continuation of the trend toward more tenancy that has been in evidence since the first report on farm tenure by the census in 1880. The 1930 census shows that the increase in the percentage of tenant-operated farms for the period 1920 to 1930 was the second highest in the 50 years during which decennial statistics have been gathered. In 1930, 42.4 per cent of all farms were tenant operated. This represents an increase of 4.3 per cent in 10 years (from 38.1 in 1920), and of this increase 3.5 per cent was in the period 1925 to 1930. The largest previous increase was from 28.4 per cent in 1890 to 35.3 per cent in 1900.

There has also been an increase in the number and percentage of owner farmers who rent land from others. These are commonly referred to as part owners. The percentage of part owners was 8.7 in 1920 and 10.4 in 1930. If the part owners and tenants are considered as one class, we find that more than half the farmers of the United States rent all or a part of the land they operate.

The percentage of tenant-operated farms varies greatly in different parts of the country. In Maine 4.5 per cent of all farmers are tenants and in Mississippi 72.2 per cent. The range in the percentage by counties is even greater than by States. (Fig. 197.)

Although the percentage of tenancy has increased in every decade since statistics were first gathered, this is the first time that the number of tenant-operated farms increased while the number of all farms decreased. There were about 160,000 fewer farms in the United States in 1930 than in 1920 and over 200,000 more tenants. It is of especial significance that this increase is composed mostly of croppers who do not even own work stock.

### Changes in Six Groups of States

A fairly good general picture of regional changes can be obtained from a consideration of six groups of States.

The Northeastern States, which include New England, New York, Pennsylvania, and New Jersey, show a decrease in the number of tenants and in the percentage of farms operated by tenants. The number of tenants in almost all of the counties in these States showed a decrease of 25 or more. In only two counties did the increase in number of tenants exceed 25. Tenancy is relatively unimportant in these States, varying from 4.5 per cent in Maine to 15.9 per cent in Pennsylvania.

The decrease in tenancy in this section seems to be in part the result of decreased competition for farm land. The older owners find it difficult to rent their farms, hence continue to live on their land and carry on some farming with such help as can be found. Families from towns and cities who want to live on farms, using them for part-time employment, usually want to buy. Many of the owners who sell give good terms, thus enabling purchasers having little capital to buy, especially since the total value of a farm is generally low.

In all of the Southern States, which include Delaware, Maryland, West Virginia, Kentucky, Arkansas, Oklahoma, Texas, and all States south of these, tenancy increased, as measured both by numbers and percentage, except in Maryland and Delaware. The census of 1890 reported that each of the three divisions of the Southern States had approximately 38.6 per cent of its farms operated by tenants, and

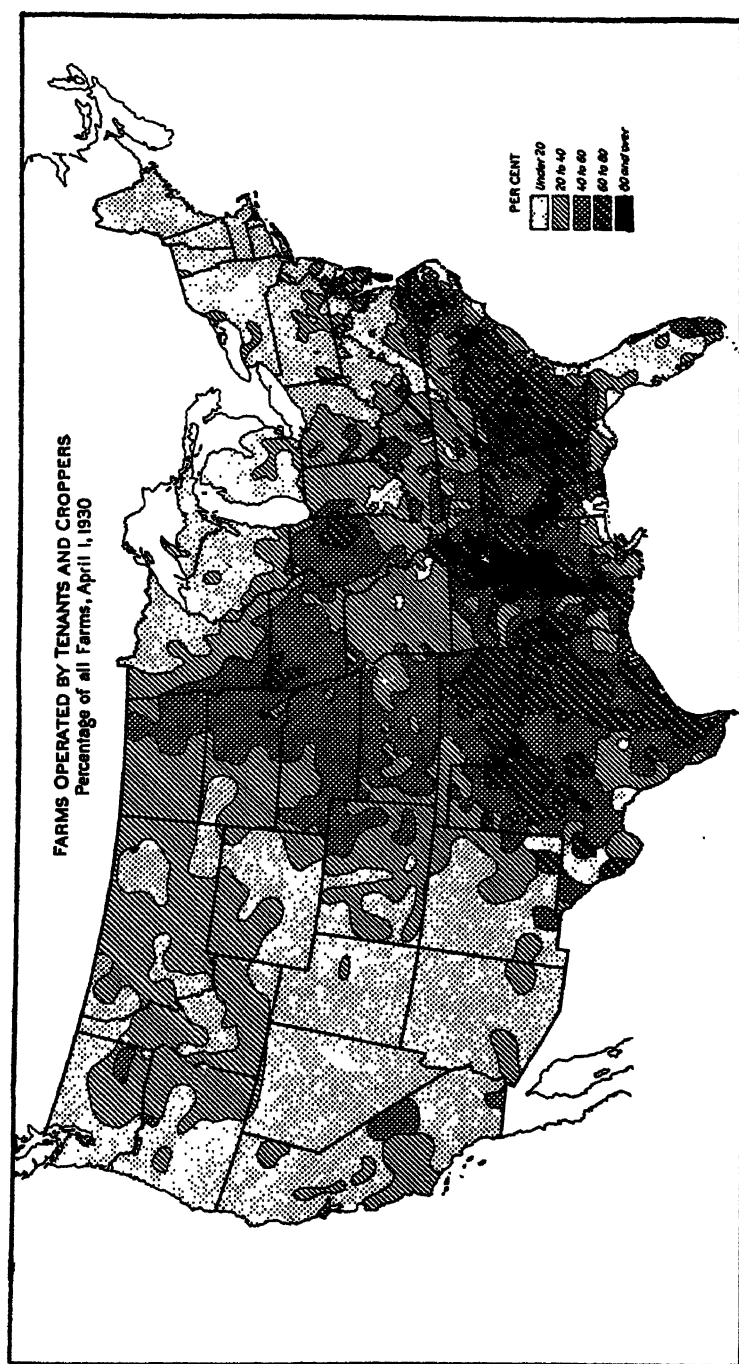


FIGURE 197.—The percentage of tenant-operated farms is highest in regions devoted to the cash crops—cotton, tobacco, corn, and wheat—mostly the Southern and Middle Western States. The percentage of tenant-operated farms is generally low in regions devoted to general and livestock farming, as in the northeastern portion of the country and in the Western States.

each census since has shown an increase. The proportions of all farmers who were tenants in 1930 were as follows: South Atlantic States, 48.1 per cent; East South Central States, 55.9 per cent; and West South Central States, 62.3 per cent. (Fig. 198.) The number of negro tenants in the cotton States decreased about 2,000 between 1920 and 1930, while white tenants increased about 200,000. Both white owners and negro owners decreased in number in these States during this period.

In practically all counties in these States in which tenancy increased there was an increase in cotton or tobacco acreage. Both of these crops require considerable amounts of hand labor, which is generally furnished by the tenants and their families. A part of the increase in tenancy may have resulted from the fact some farmers were forced to give up their farms because of inability to continue payments on the mortgages during the period of low prices. The counties showing

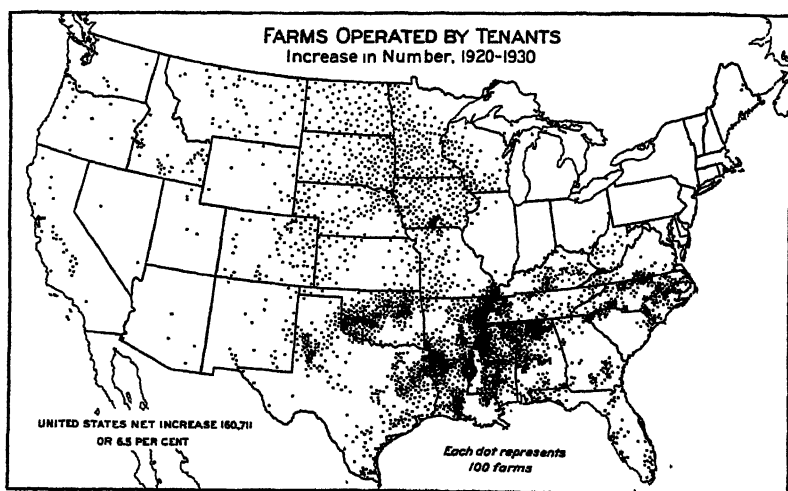


FIGURE 198.—The number of tenant-operated farms increased generally in sections in which the number of all farms increased. An exception is found in the wheat-growing sections, where farms are being consolidated

decreases in tenancy are, as a rule, those in which there has been a decrease in the number of all farms.

The East North Central States, except Wisconsin, have shown marked decreases in tenancy. (Fig. 199.) Only 23 counties in Ohio, Indiana, Illinois, and Michigan had an increase of 25 or more tenants from 1920 to 1930. It is probable that the decrease in tenancy in the East North Central States is associated with the development of a situation similar to that in the Northeastern States—that is, less competition for farm land due in part to the growth of industry.

As a group the West North Central States and Wisconsin have definitely moved toward more tenancy. (Fig. 198.) The increase in tenancy in the West North Central States is without doubt the result of the price situation. Land bought in the period of high prices could not be paid for, with the result that it is now operated by tenants.

The percentage of tenant-operated farms in the Rocky Mountain States increased from 15.4 to 24.4 in the decennial period 1920 to 1930. The number of tenants is not large in many of the counties in this division, but the increase was general. Of the 268 counties in these eight

States, 177 counties showed an increase of 25 or more tenants and only 3 showed a decrease of that number. The increase in tenancy in these States is the result of the low prices of farm products, and is similar to that which has taken place in the West North Central States.

The change in the percentage of tenant-operated farms in the Pacific Coast States has not shown a definite trend during the period for which data are available. The percentage of tenancy decreased in the three States taken as a whole from 20.1 to 17.7 per cent in the decade 1920 to 1930. Approximately one-third of the counties showed increases of 25 or more tenants, another one-third showed decreases of that number, and the remaining one-third of the counties showed very small changes. In all three States many counties have shown an increase in the number of owners of specialized farms devoted to fruit, poultry,

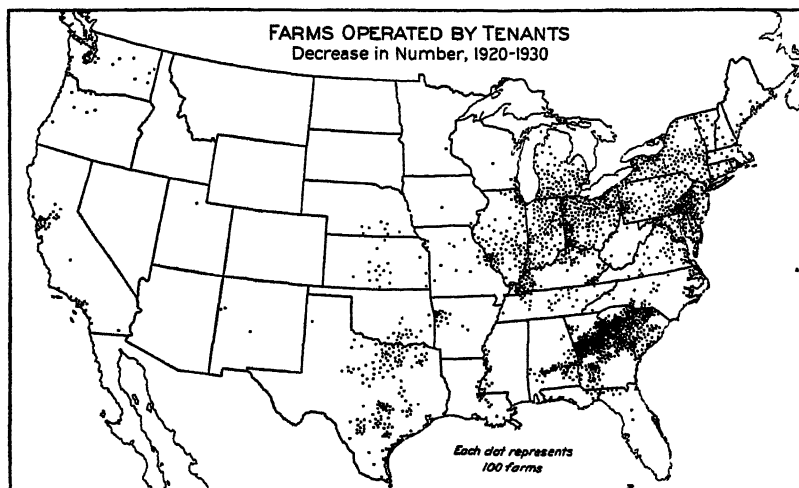


FIGURE 199.—The two areas showing greatest decrease in the number of tenant-operated farms are the northeastern and southeastern portions of the United States. Both also showed large decreases in the number of all farms

and dairy production, which enterprises are not well adapted to tenant operation, but there are counties in which the owners who bought land at high prices have lost their farms, thus increasing tenancy.

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### FARM POPULATION IN DECADE 1920-1930 SHOWS A CONSIDERABLE DECREASE

The outstanding change in the farm population within the decade 1920-1930 is a considerable decrease. In 1920 the farm population of the United States, as enumerated and reported by the Bureau of the Census, amounted to 31,614,269 and formed 29.9 per cent of the total population. In 1930 the Bureau of the Census reports the farm population to be 30,445,350, forming 24.8 per cent of the total population. The crude decrease between the 1920 and the 1930 enumerations is 1,168,919. The Bureau of the Census says:

The farm population as shown for 1930 comprises all persons living on farms, without regard to occupation. The farm-population figures for 1920 include, in

addition, those farm laborers (and their families) who, while not living on farms, nevertheless lived in strictly rural territory outside the limits of any city or other incorporated place. Though the number of additional persons thus included is believed not to have been very great, some allowance should be made for this difference in definition when comparing the figures. Further allowances should be made for the fact that the 1920 census was taken in January, when considerable numbers of farm laborers and others usually living on farms were temporarily absent, while the 1930 census was taken in April, when by reason of the advancing season the number of persons on the farms was appreciably larger.

### Seasonal Variation in Farm Population

The fact stated by the Bureau of the Census, that these two enumerations of the farm population are not wholly comparable, is important in understanding the changes recorded. The number of persons living on farms in the United States is doubtless fluctuating all through the year, from a low point in midwinter to a high point in spring and summer. There are many fluctuations and differences in States, due to the varying make-up of the farm populations, to the prevailing age of the farm operators, to differences in birth rates between sections of the United States and to the nature of the farm enterprises, which may require large temporary forces of laborers in some instances or a rather constant supply of laborers in others.

To make an enumeration in winter is to get a count of the permanent core of the agricultural people; to make it in the spring is to add to this permanent core a temporary increment from towns and cities of persons who consistently divide their occupational allegiance between town and farm. No one knows at present how large a temporary force the permanent farm population requires to carry on its spring and summer work. Undoubtedly in some of the States showing an increase in farm population in April, 1930, the increase is due almost entirely to this temporary increase of laborers. In late years it has also become a practice in some sections where the nature of the farm enterprise permits, for the farm family to leave the farm and go to town for the education of children or to travel. This temporary force, added to the farm population in the spring and summer, may reach a total for the United States of from 2,000,000 to 3,000,000 persons.

The significant fact of the decrease in farm population between 1920 and 1930, however, must not be overshadowed by the fact that these two enumerations are not entirely comparable. There have been several streams of influence which explain a gradual decrease of farm population in the United States.

### Mobility of the American People

The great mobility of the American people is striking. Since 1870 the census has recorded the State in which each person was born; and the number of persons registered as living, decade to decade, in California, Iowa, Illinois, Missouri, New York, and other States, but born in Vermont, Virginia, Texas, Louisiana, and other States, is interesting and enlightening. This mobility has been an economic safety valve. Farming has not become an occupation so socially rigid that the farmer has been shut off from other economic opportunity. Undoubtedly this democracy of occupation and economic opportunity is an advantage to agriculture as well as to the Nation at large.

In 1790, 96.7 per cent of our population was "rural"—composed virtually of farm and village population. In the next 50 years, up to

1840, the rural population declined to 91.5 per cent of the total population; in the next 30 years (to 1870) it declined to 79.1 per cent. By 1880 it had declined to 71.4 per cent; by 1890, to 64.6 per cent; by 1900, to 60 per cent; by 1910, to 54.2 per cent; and by 1920, to 48.6 per cent.

### Absolute Decreases by States

Inspection of the rural population by States shows that absolute decreases in numbers took place in Vermont and New York in each of the following decades: 1880 to 1890; 1890 to 1900; 1900 to 1910; 1910 to 1920. In Maine, New Hampshire, Ohio, and Illinois, absolute declines in numbers took place in three of the four decades noted above. Furthermore, in 18 States there was an absolute decline in numbers during the decade 1910 to 1920. The presumptive evidence is strong that if the farm population had been tabulated separately in the census during the decades before 1920, it would show not only a relative decline in percentage, but an absolute decline in numbers in the farm population in certain States from 1880 to 1920. Indeed, it is almost certain that the total farm population of the United States in absolute numbers declined from 1910 to 1920.

It must be evident that there is a reason for the main decline in numbers of farm people which has no explanation in the facts of war or postwar influences.

Three factors can not escape notice—factors which though related have not become simultaneously and equally effective in all States. These factors, moreover, while accounting for a decrease in farm population, make for agricultural prosperity. There is a conflict of forces at work, all tending to build up agriculture, but also tending to decrease the number of farm people to a point where the number is adjusted more perfectly to the agricultural task:

(1) There is the bodily transfer of several important agricultural processes from the farm to the town and city, in connection especially with grain, livestock, and milk; (2) the mechanization of many agricultural processes remaining on farms, especially in plowing, planting, harvesting crops, in feeding and care of animals, in dairy operations, and in automobile transportation; (3) and perhaps most important, the improvement through scientific methods of agricultural production, such as improved breeds of grains, vegetables, fruits, and animals, improved conditioning of soils, improved protection against plant and animal diseases.

It is difficult to imagine any other result of these three important forces operating upon American farming than the normal reduction of the necessary number of persons and families to produce the food and fiber for the Nation.

The agricultural depression of 1921 undoubtedly accentuated the long-time downward trend of farm population, but this fact should not blind us to the operation of the normal forces of adjustment which have long been operating in the interest of agriculture. We are not to expect a decline in farm population below the point of a number of persons adequate to carry on farm production for the needs of the Nation. Indeed, as population in the United States increases, we may see an upward adjustment to give adequate production.

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## WORKERS GAINFULLY EMPLOYED IN FARMING DECREASE IN RECENT YEARS

In the last 20 years there have been marked declines in the numbers of certain classes of agricultural workers, and in the proportion of the gainfully occupied population engaged in agriculture. According to the census the proportion of the gainfully employed persons engaged in agriculture was 32.9 per cent in 1910; 26.3 per cent in 1920; and 21.5 per cent in 1930. One hundred years ago over two-thirds of the persons gainfully employed were engaged in agriculture.

The census of 1910 was taken as of April 15, and that of 1930 as of April 1. Because the census of 1920 was taken as of January 1, its occupational statistics, especially as to agriculture, are not fully comparable to those of the other two censuses; consequently the 1920 statistics are not further considered here. Female workers also are not considered in the comparisons made, because statistics relating to them in the 1910 census are not fully comparable to those of 1930. The changes in total numbers of males engaged in agriculture, of wage-earning farm laborers, and of unpaid family laborers are to be considered principally.

The census of 1910 reported 10,583,212 males engaged in agriculture; that of 1930 enumerated 9,568,347. This indicated a decline of 1,014,865 persons, or 9.6 per cent. There were 2,642,070 male farm laborers "working out," and other wage workers in agriculture in 1910. They may be compared, roughly, with 2,555,935 farm laborers working for wages in 1930; and 2,133,949 farm laborers "working on home farm" in 1910 as compared, roughly, with 1,171,687 unpaid family workers in 1930. (See footnotes to Table 7.)

TABLE 7.—Changes in number of males 10 years of age and over engaged in agriculture, between April 15, 1910, and April 1, 1930, by geographic divisions

[Decrease indicated by minus sign (—); increase, by plus sign (+)]

Geographic division	Numerical change			Percentage change		
	Total	Paid <sup>1</sup> workers <sup>1</sup>	Unpaid family <sup>2</sup> workers <sup>2</sup>	Total	Paid <sup>1</sup> workers <sup>1</sup>	Unpaid family <sup>2</sup> workers <sup>2</sup>
	Number	Number	Number	Per cent	Per cent	Per cent
New England.....	-64,090	-12,648	-14,170	-23.7	-11.8	-60.5
Middle Atlantic.....	-204,215	-71,045	-56,479	-26.5	-25.2	-64.9
East North Central.....	-351,592	-60,734	-100,900	-19.9	-13.0	-58.9
West North Central.....	-103,916	+40,244	-154,639	-5.9	+10.9	-48.1
South Atlantic.....	-272,678	-27,754	-208,814	-14.0	-6.0	-40.7
East South Central.....	-260,040	-48,833	-177,267	-11.8	-17.0	-38.5
West South Central.....	-20,354	-4,421	-182,815	-1.3	+1.2	-44.2
Mountain.....	+77,632	+10,570	-382	+22.0	+14.7	-2.9
Pacific.....	+124,723	+73,644	-12,066	+33.2	+43.1	-45.9
United States.....	-1,014,865	-80,135	-962,262	-9.6	-3.3	-45.1

<sup>1</sup> The classes included are: In 1910—dairy-farm laborers; farm laborers (working out); gardeners; florists; garden, cranberry-bog, greenhouse, orchard, and nursery laborers; corn shellers, hay balers, and grain threshers; ditchers; poultry raisers and poultry-yard laborers; stock herders, drovers, and feeders; and other and not specified pursuits; in 1930—farm laborers, wage workers.

<sup>2</sup> The classes included are: In 1910—farm laborers, home farm; in 1930—farm laborers, unpaid family workers.

<sup>3</sup> There is some overlapping of classes, but the comparability of the data chosen seems not much affected. While some entrepreneurs and unpaid workers were enumerated by the census among the classes here included as paid workers, most of the people included in these classes appear to have been wage workers. It is known that some home-farm laborers receive wages. Unpublished data of this department indicate that of total time spent on farm work in a year about 4½ per cent is put in by paid members, and 23½ per cent by unpaid members of the farm operators' families. These figures apply to the United States as a whole. There are wide differences in the various States.

Between 1910 and 1930, all of the geographic divisions except the Rocky Mountain and Pacific lost in number of males engaged in their agriculture. The heaviest losses were in the Northeast. In these Northeastern States there occurred also the greatest decline in numbers of farms. The lowest losses were in the West Central States, where there were gains in numbers of farms. In all except two States east of the Mississippi, numbers of persons in agriculture decreased, the losses ranging from 2.3 to 35.1 per cent. In Wisconsin the number was practically stationary (0.1 per cent gain), while in Florida the gain was 25.8 per cent. In the 11 far Western States the 9.5 per cent loss in New Mexico was more than offset by gains elsewhere, running to 75.7 per cent in Arizona. California's gain of 57.5 per cent was numerically over half the net gain of the far Western States. The notable spread of intensive agriculture doubtless explains much of the gain in Florida, Arizona, and California. Changes in number of males engaged in agriculture are closely related to changes in numbers of farms and in type of farming, and to extension of use of labor-saving equipment.

### Loss in Unpaid Family Workers

Most of the Nation's loss in male agricultural workers has been of unpaid family workers. This loss was about 962,000 persons, or 45 per cent. Each geographic division, and all except four of the Rocky Mountain States, reported such losses. As in the case of total males, the heaviest losses were in the Northeast, running to 74.1 per cent in New Hampshire. The loss was 68.6 per cent in Indiana and in Illinois. The lowest regional loss was 2.9 per cent in the Rocky Mountain States. This decline was numerically unimportant for the division, but there were sharp declines in some States nearly balancing sharp gains in others. Utah and New Mexico had the greatest losses, and Montana and Arizona the greatest gains in the division. The loss of unpaid family workers in California was large in percentage, but small in numbers, comparatively, because of the unusually high proportion of hired workers among the males in the State engaged in agriculture.

From 1910 to 1930 the United States lost 86,135, or 3.3 per cent, of its paid male agricultural laborers. Each geographic division east of the Mississippi River reported loss, while those to the west gained. In the East, the Middle Atlantic division had decidedly the highest loss, 25.2 per cent. Only two eastern States, Florida and Wisconsin, made large gains, 67.4 and 24.6 per cent, respectively. West of the Mississippi, Louisiana sustained a 33.1 per cent loss. California's gain of 66 per cent, or 73,506 such workers, was greater than that of any other three States, and practically all of that on the Pacific coast.

Male paid workers and male unpaid family workers on farms were not the only occupational classes to gain or lose. In addition, farm operators declined sharply in numbers east of the Mississippi River, and slightly in the West North Central States. In the South Central and far Western States the number of farm operators increased, especially in the West South Central and the Pacific States.

Because agriculture is fundamental to the production of the food supply of the Nation, the decline in numbers of farm workers may at first seem startling. But this result has been brought about by a steady increase in production per worker fully sufficient to meet the agricultural needs of the Nation.

JOSIAH C. FOLSOM, *Bureau of Agricultural Economics.*



# HOW TO USE FARM CREDIT

## TOTAL INDEBTEDNESS OF UNITED STATES FARMERS ESTIMATED AT 13 TO 14 BILLIONS

Economic developments since 1920 emphasize clearly the importance of a conservative use of credit in the production program of the farmer. Although it is impossible to avoid a large part of the distress and financial embarrassment resulting from such a drastic price decline as has occurred in recent years, many present difficulties are due directly to the careless use of credit. Others are due to the lack of credit in the proper amount and at the proper time.

The types of credit employed in agriculture fall mainly into four classifications: Real estate mortgage credit, short-term loans, intermediate-term loans, and merchant credit. A fifth group, marketing credit, might be included; but inasmuch as it is more frequently negotiated by others than farmers and is obtained largely from financial institutions in the larger centers, it may be logically included in short-term commercial bank credit.

Of the various types of agricultural credit, farm real estate loans are the most important from the standpoint of volume. The total farm-mortgage indebtedness materially exceeds \$9,000,000,000, notwithstanding a slight reduction in the last two or three years, partly as the result of amortization of principal, but primarily through an increased volume of foreclosures.

The short-term indebtedness of farmers is represented chiefly by loans from local banks in agricultural areas. In 1923, loans of this character were estimated at slightly less than \$3,000,000,000. This amount has since been somewhat reduced by the large number of bank suspensions and through the policy of country banks in making investments outside their communities an increasing proportion of their total assets.

Satisfactory estimates of the amount of intermediate-term loans owed by farmers are not available. A large proportion of the loans of this type is included in the total credit advanced to agriculture by country banks. Additional amounts have been advanced by livestock-loan companies and by farm-implement companies. On September 30, 1931, rediscounts of the Federal intermediate-credit banks totaled \$81,000,000. This amount, however, also includes short-term loans for crop production.

Data on the amount of outstanding merchant credit are likewise meager and unsatisfactory. The annual volume of such credit has been estimated to exceed \$1,000,000,000. Other short-term obligations of farmers, owed largely to individuals, and for which no estimate is available, doubtless also amount to a substantial sum.

## Shift in Credit Sources Since 1920

Since 1920, there has been a marked shift in the sources supplying credit to farmers. The collapse of the war-time inflation boom occurred at a time when farmers generally were heavily indebted to local banks and to local dealers for supplies and equipment. In the period immediately following, a large part of this short-term indebtedness was funded into long-term real estate loans. The volume of farm-mortgage indebtedness which was estimated at \$7,857,700,000 in 1920 increased to a total of \$9,360,620,000 in 1925, and in 1928 it was placed at \$9,468,526,000. In 1930, the total indebtedness showed a slight decline to \$9,241,390,000. The sources of these loans in 1928, classified according to the principal groups of lenders, were as shown in Table 8.

TABLE 8.—*Sources of loans to farmers in 1928*

Lending agency	Amount		Lending agency	Amount	
	<i>Million dollars</i>	<i>Per cent</i>		<i>Million dollars</i>	<i>Per cent</i>
Federal land banks.....	1, 146	12. 1	Active farmers.....	339	3. 6
Joint-stock land banks.....	667	7. 0	Other individuals.....	1, 453	15. 1
Commercial banks.....	1, 020	10. 8	Other agencies.....	685	7. 2
Mortgage companies.....	988	10. 4			
Insurance companies.....	2, 164	22. 9	Total.....	9, 468	100. 0
Retired farmers.....	1, 006	10. 6			

Since 1920, the Federal and joint-stock land banks have assumed an increasing importance as a source of farm mortgage credit. Loans from individuals and banks, however, have decreased in both relative and absolute importance. Life-insurance companies have risen to the leading place in financing farm-mortgage credit requirements.

The present lack of local credit facilities in many localities, occasioned by numerous failures of country banks, has led to an increased interest in the organization of agricultural-credit corporations and similar institutions utilizing the rediscount facilities of the Federal intermediate-credit banks. The expansion of this type of credit, however, has been relatively slow. In April, 1931, there were 330 credit corporations and livestock-loan companies using Federal intermediate-credit bank facilities. These corporations had a total unimpaired capital, surplus, and undivided profits, of \$21,825,000.

Considerable assistance has been supplied by the Federal Government in meeting the most pressing credit requirements of farmers in areas seriously affected by the drought or other climatic adversities. Since 1921, seven annual appropriations, totaling \$83,750,000, have been made by Congress for loans directly to farmers, chiefly for the purpose of purchasing seed, feed, and fertilizer. In 1931, total appropriations for these emergency purposes totaled \$67,000,000 and loans were made in 32 States.

In all, the total indebtedness of farmers for all purposes may be roughly estimated at \$13,000,000,000 to \$14,000,000,000. The annual interest charge on this indebtedness may be assumed to average about 6 per cent on the real estate indebtedness, 8 per cent on the short-term indebtedness, and between 15 and 20 per cent on merchant credit, making an annual carrying charge approximating \$900,000,000. Much of this interest burden might well have been avoided by a more conservative use of credit. Excessive reliance on credit, however, is

by no means a universal trait of farmers. As a class they have smaller credit obligations in proportion to their assets than have most other economic groups. Many farmers avoid resorting to credit even when it could be used to decided advantage.

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## MERCHANT CREDIT IMPORTANT IN FARM FINANCE, BUT MAY HELP OR HARM THE FARMER

Older than any of the forms of cash borrowing is the use of credit in purchasing goods. The seller, usually a merchant or dealer, becomes a source of credit by permitting payment at a later date. No conclusive figures are available for the annual amount of farm credit extended by merchants and dealers in the United States but it probably exceeds \$1,000,000,000.

Such credit used by farmers varies materially among the different sections of the country. It is relatively more important in the South than in the North and West, and its use varies with the amount of purchased materials or equipment necessary to produce the year's crop or other farm products.

The purposes of merchant credit naturally conform to the demands of the type of farming served. Dairy feeds in the North Atlantic States, fertilizer in the South, and machinery and equipment in the West are particularly important items frequently purchased on time. Although the most widespread use of merchant credit is probably for the purchase of household supplies and hardware, there is a tendency for this type of credit to be concentrated on the items requiring large expenditure. In 1931 manufacturers estimated that one-third of all fertilizer used in the South was purchased on credit. On the Eastern Shore of Virginia where early potatoes are the main cash crop and fertilizer the largest single item of supply expense, approximately 85 per cent of the fertilizer used for this crop in 1928, 1929, and 1930 was sold to farmers on time.

The agencies which extend merchant credit to the farmer include the local storekeeper; the local dealer in machinery, feed, or other supplies; seed and fertilizer companies; and local and central marketing agencies. Oftentimes the local agencies in turn receive a large share of their financing in the form of merchant credit extended by wholesale houses and other central agencies. In the case of the Virginia potato area, about 50 per cent of the fertilizer was sold on time to the supply dealers by fertilizer companies.

### Sometimes a Major Form of Credit

At times in certain localities merchant credit has become a major form of credit, because of emergencies arising out of bank failures, crop failures, or poor prices. In such cases merchant credit has been of great service to the farmer notwithstanding its relatively high cost. Because it is the most direct, it is often the most convenient means of borrowing. Even for those to whom bank credit is available it cares for many small items for which payment in cash can not be made readily because borrowing at the bank is done in larger sums.

Arrayed against these advantages, however, are other considerations which tend to make merchant credit a wasteful and dangerous

form of financing. The cost generally is higher than for other credit, the cost burden is inequitably distributed, and the ease of credit accommodation favors overspending.

The cost is greater because of greater risk and a more lax security policy. Frequently the actual cost is concealed. Very generally, goods sold to farmers on time bear a higher price than when sold for cash. This difference in time prices and cash prices often is so large as to constitute a rather startling interest cost when expressed as a per annum rate. The facts that a part or all of the credit cost is so generally in the form of an increase in price, and that such credit usually runs for varying periods, make difficult the computation of the actual rate of cost. The pronounced differences in the cost of merchant credit and credit from cash-lending institutions as found in studies made in Southern States, are indicated in the following Table 9.

TABLE 9.—*Costs of merchant credit and cash credit in five Southern States expressed as rates per annum*

State	Year	Merchant credit	Cash credit
		<i>Per cent</i>	<i>Per cent</i>
North Carolina.....	1926	25 0	7 7
Georgia.....	1926	26.3	11.5
South Carolina.....	1926	31 6	9.6
Arkansas.....	1920	17 7	8.7
Oklahoma.....	1925-26	34.8	11.4

### The Factor of Risk

In much of the merchant credit, added risk arises from the financing of a more hazardous type of enterprise as well as from lower financial responsibility of many of its users. The preferred part of the community's credit demand will ordinarily be met by cash-lending institutions operating under interest-rate restrictions. The less substantial borrowers that tend to rely upon dealers for credit find accommodation only upon such terms as will permit the absorption of losses from unpaid accounts. Those who pay their bills also pay heavy losses chargeable to those who do not. These losses often offset the greater part of the credit charge as shown by a tabulation (Table 10) of merchants' reports obtained in credit surveys in North Carolina and South Carolina.

TABLE 10.—*Charges and losses on merchant credit in North Carolina and South Carolina, expressed as rates per annum*

State	Charges	Losses	Gain
	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
North Carolina.....	23 3	13 9	9.4
South Carolina.....	35.0	14.6	20.4

The allowance for loss which the time merchant finds necessary in view of the character of his trade as a whole, represents a serious waste for the community and imposes a severe penalty on the debt-paying farmer. In some localities prices of goods sold on credit may not be higher than the prices for cash purchases at the same store. Prices in

such stores, however, commonly are somewhat higher than those in stores selling on a strictly cash basis. The loss from unpaid accounts in this case is distributed among all the customers rather than among only those who use credit. The convenience which store credit offers may easily result in a habit of overspending. This is doubly disadvantageous because of the additional cost involved in the higher credit price on the goods.

### Change Would Have Broad Advantages

The farmer who uses merchant credit from habit rather than from necessity can improve his position by getting out of that class of borrowers. Graduation into the class that uses bank credit instead of merchant credit often requires changes in the type and methods of farming as well as in the financial practices. Less reliance on a single crop, a production plan requiring fewer purchases, or a larger farm unit may be necessary. A record for reasonable efficiency in production and some unencumbered assets saved and accumulated from earlier years, are usually required from applicants for bank credit. Only by energetic striving for these qualifications, if they are not already possessed, can the present users of merchant credit hope to escape from the waste and expense generally associated with it. The more general substitution of cash credit from conservative and specialized credit agencies for the present more haphazard merchant credit, will in the long run benefit not only the farmers and the bankers but the merchants as well.

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*Bureau of Agricultural Economics.*

### INTERMEDIATE CREDIT FACILITIES CAPABLE OF SUBSTANTIAL EXPANSION

Loans for the purposes of improving, stocking, or equipping the farm can not, as a rule, be repaid within the period usually allowed on short-term production credit. They may require a term of two or three years, but do not call for the very long term usually needed in the case of farm mortgages. Such loans have come to be known as intermediate credit. Loans to provide farm buildings and machinery, tiling or fencing, work stock, dairy or beef cattle to diversify production, are quite likely to require an intermediate term.

On many farms the reorganization of the production program to obtain a better and fuller use of the land and of the labor time of the farm operator and his helpers, may bring an appreciable increase in the annual net returns. With better equipment it may be possible to care for the field work of certain additional crops without any increase in labor. On many farms, additional livestock can be profitably used as a means of marketing surplus feed supplies. In the so-called 1-crop regions, a considerable reduction in the "out-of-pocket" expenses can be obtained by producing a larger proportion of the food and feed supplies needed on the farm. In order to accomplish this, it is frequently necessary, however, to increase the investment in livestock, in housing, in fencing, and in other farm and soil improvements.

The farmer should first appraise carefully the increase in his net annual returns that may be expected from his proposed investments. Farmers occasionally buy expensive equipment which accomplishes a material saving in labor time, but at a season when the released labor can not be profitably employed in other productive enterprises. In such instances, the investment in the machine merely results in increasing overhead costs without increasing farm returns. Unless the individual farmer already has a current income well above his current obligations, expenditures of the type which facilitate farm operations but do not increase the net income should be entered into with extreme care. The thoughtless borrower otherwise may be forced to sacrifice some of his personal property in order to meet payments on intermediate obligations.

### Partial-Payment Plan

It is highly desirable that repayment of loans for these purposes be made on the partial-payment plan. In such case, the principal should be reduced as rapidly as possible in order to lessen the risk of price fluctuations. This risk increases, of course, with the length of the loan period. The crop yield on a given farm may at times vary even more than the price of farm products. With uncertainties in both price and yield, all years of favorable income should be taken advantage of to retire as much of the obligation as is consistently possible.

For the different classes of livestock more or less definite price cycles have hitherto occurred, making them sometimes high and at other times low in relation to the general price level. Borrowing to expand operations in a given class of livestock when prices are relatively high involves not only the risk of a disappointing income from the livestock as prices decline, but also involves a reduction in the value of the underlying security. This decline in inventory value may cause the forced liquidation of the loan by sale of the security. Years of favorable prices give opportunity for producers to reduce their credit obligations to a minimum, thus accumulating a reserve borrowing power which can be used in expanding operations when prices have reached a lower level.

The country bank has been the chief source of intermediate credit, loans being obtained for short periods and frequently renewed. This short-term renewal plan has the disadvantage that the bank may find it necessary to require prompt payment if credit conditions become unfavorable. Often renewals of this type of loan are willingly granted when farm returns are favorable, and under such conditions the borrower frequently accepts the renewal and expands his operations on the basis of his increased income. In years of unfavorable farm income, on the other hand, the bank may require the maximum liquidation. The result is too often a pyramiding of credit in good years and a severe contraction in years of reduced income and prices.

### Loans by Implement and Livestock Companies

A considerable volume of intermediate credit has been extended by farm-implement companies and livestock-loan companies. Such credit from the former is often costly and is usually extended to facilitate sales with little regard to its advantage to the farmer. Livestock-loan companies of the older type performed a valuable

service, but loans from these agencies were confined chiefly to larger growers and feeders.

In 1923 the Federal Government established 12 Federal intermediate-credit banks to provide farmers with credit of an intermediate term. These banks do not make direct loans to individual farmers. They discount farmers' notes for banks and other credit agencies, and are authorized to make direct loans to farmers' cooperative associations.

Several hundred agricultural-credit corporations have been organized to obtain credit for farmers by using the discount facilities of the Federal intermediate-credit banks. The term of loans and discounts by these banks is limited to a maximum period of three years, and in practice has rarely exceeded one year. Renewals, however, are granted when circumstances justify, and these banks, which draw their loanable funds from the central money markets through the sale of debentures, are more likely to be in position to grant renewals than are many commercial banks that rely upon deposits.

### Management by the Banks

The 12 Federal intermediate-credit banks are managed by the same directors and officers that manage the Federal land banks, each Federal land-bank board having charge also of one intermediate-credit bank. All these banks, as well as the joint-stock land banks, operate under the supervision of the Federal Farm Loan Board in Washington, D. C.

The Federal intermediate-credit banks have as yet supplied only a small part of the intermediate credit needed by farmers. They have, nevertheless, been of real assistance to farmers' cooperative marketing associations and to many local credit institutions and their farmer clients, in areas where this new source of credit has been used. Their loan and discount operations are capable of a very substantial expansion.

In most communities there has been a lack of local credit agencies that were willing and able to use the discount facilities of these banks. The recent action of the Federal Farm Loan Board in allowing the local bank or credit corporation a somewhat wider spread between the discount rate and the rate charged the borrower may be expected to increase the use of these discount facilities to the benefit of the farmer in need of credit. This should be particularly true of farmers who have in mind well-considered farm improvements and programs that require credit for an intermediate term.

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### SHORT-TERM CREDIT IS BEST RESTRICTED TO PRODUCTIVE USES

It often is said that farmers should use short-term bank credit only for productive purposes. Taken literally, this means that farmers should not borrow unless by so doing they can increase their profits or avoid losses. The rule is intended to discourage unnecessary or wasteful expenditures by the use of credit.

Although opinion may be divided as to the rigidity with which this rule should be applied, few persons will deny the wisdom of its warning. It is a common weakness to desire comforts and luxuries that are beyond one's means. For this reason it is hard to deny oneself when credit is easily obtained. If comforts or luxuries are limited to those which can be purchased with funds actually possessed, the worst that can happen is failure to accumulate savings. When they are purchased with credit, however, the result is likely to be a burden of indebtedness which will become progressively more difficult to carry. Limiting borrowing to the necessities of production is one of the surest methods of avoiding extravagant expenditure and of accumulating a reserve for future needs.

If the spirit of the rule is borne in mind, the term "productive purposes" may be liberally interpreted. Borrowing to pay taxes, necessary living expenses, and interest on mortgage indebtedness may be sound uses of bank credit, if the amount of such borrowing is kept well within the farmer's current income-producing power. Frequently, expenses of this character have to be met at a time when it is disadvantageous to dispose of crops or livestock. In such cases, it is most profitable to meet those needs by borrowing, and to mature or hold products until they may be sold to better advantage. Unforeseen emergencies may necessitate borrowing for purposes that would not ordinarily be classed as productive.

Under some circumstances, it may even be desirable to borrow for vacations, automobiles, or radios. But these are border-line cases and may easily be carried to excess. The spirit of the rule is to keep expenditures well below income so that each year one's accumulation of savings will be increased.

### The Bankers' Problem

Unwise loans not only are a detriment to the borrower but they also are likely to impair the services of banks. Each year many farmers of a community need financial assistance in growing and marketing their products. Banks have a fund of deposits from which they make advances for these purposes. Once the funds are loaned, however, future advances depend upon the repayment of advances made in the past. Loans made to finance the operations of one season must be paid if the banks are to have funds for financing the next season's operations. When borrowers fail to pay their notes, they impair their own borrowing positions and reduce the ability of banks to finance local productive operations. Furthermore, excessive loans frequently cause banks as well as farmers to become hopelessly insolvent.

When borrowing seems advisable, or becomes necessary, farmers should attempt to obtain loans that will not mature before there is a reasonable chance of paying them. It is a widely prevailing practice among bankers to date notes at 60, 90, or 180 days with the tacit understanding that they will be renewed at maturity if the funds are needed for a longer period and if conditions of the loan remain sound. When all is going well, this practice works little, if any, hardship to farmers. But it is likely to produce a false appearance of liquidity in banks, and in a time of stress farmers may be asked to pay before they are in position to do so without disrupting their farming operations. Both bankers and farmers should be benefited by a careful consideration of the time within which payment is likely to be possible and a

frank recognition of the necessary duration of the loan in the conditions of the note.

Most country banks have a customary rate of interest which is charged to the rank and file of borrowers. Nearly always, however, some farmers obtain preferential rates by reason of borrowing large amounts, offering excellent security, and carrying large deposit balances. While banks need some average rate on their loans in order to maintain themselves, it is not necessary that this rate be charged to all borrowers. Farmers who are more than ordinarily valuable to their banks may reasonably expect to receive advantages in the form of preferential borrowing rates. On the other hand, farmers who are poor credit risks and whose deposit accounts are a source of more expense than income to the banks find it difficult to secure loans even at the customary rate.

### Interdependence of Banker and Farmer

What has been said here emphasizes the interdependence of banker and farmer. For the financing of current operations, most farmers have few, if any, sources of credit other than their local banks. Local banks, in turn, depend mainly on local deposits for their loan funds. The high charges for loans which are paid by farmers in many areas may be traced directly to the personal and agricultural risks involved in such loans and to the inadequacy of local supplies of deposit funds.

Because of this interdependence, farmers and bankers will profit most from an attitude of utmost frankness, sympathy, and fairness in their relations with each other. By making a complete and accurate statement of his financial position the farmer gains the benefit of the banker's opinion on the soundness of his proposed venture. The banker in turn is assisted in maintaining a condition that will enable him to finance the requirements of his farmer customers. By explaining frankly the reasons for refusing a given loan, the banker may save his farmer customer from an unwise venture and save his bank from the resentment of an offended customer. Frankness and fair dealing promote the most friendly relations between banker and farmer, with profit to both.

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### MORTGAGE CREDIT USE REQUIRES CLOSE STUDY OF LONG-TERM FACTORS

At least once in the life of nearly every farmer there arises the question whether he will use farm-mortgage credit. Such credit usually represents a major credit transaction in which the farmer employs the greater part of his property to secure the loan, and assumes a debt which, on the average, continues in whole or in part for an active lifetime. Whether the mortgage results in improving the farmer's financial condition depends largely upon how he deals with several special problems connected with the proposed loan. The more important of these are the problems presented by the trend of prices during the term of the mortgage, the amount of the mortgage with relation to the productive capacity of the farm involved, the use that is made of the borrowed money, the cost in the form of interest and commission charges, and the conditions of repayment.

The more common occasions for a farm mortgage are the purchase of a farm, the improving or equipping of a farm already owned, or the funding or refunding of existing credit obligations. Land acquired by this means should give reasonable assurance of yielding an income covering interest and other fixed costs, in addition to operating costs. Improvements made by means of credit should increase farm production or decrease costs. Funding or refunding of outstanding debt should result in reduced cost of credit and in added assurance that payments will not fall due until funds for such payments are available or renewals can be arranged. Since the amount of the farm mortgage usually is several thousand dollars, and is materially larger than other farm credit transactions, the ultimate effects of accumulating interest are more serious than on other farm credits. Therefore it is important to have clearly in mind the means by which interest charges at least are to be earned, when deciding what purposes warrant the use of the farm mortgage.

Occasionally the farm mortgage serves a useful purpose in replacing or consolidating other forms of credit, as for example when local capital is depleted by crop failures or low prices or when for these or other causes local banks fail or bank credit becomes restricted. When capital funds are thus used for current operating purposes it is particularly important that the activities financed should earn the means of repayment and that returns should be set aside for that purpose.

### Repaying Power Rather Than Borrowing Power Should Govern

Too often farm-mortgage loans have been limited only by what could be borrowed rather than by what could be repaid. If a mortgage loan

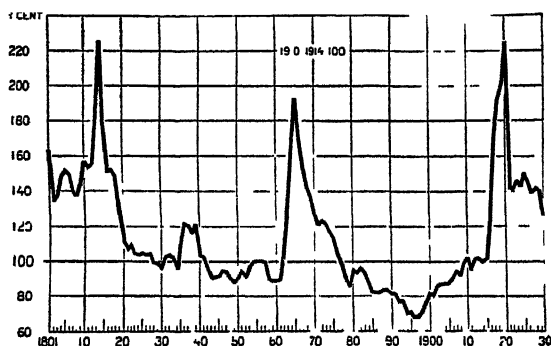


FIGURE 200—Three times since 1900 prices have risen to very high levels—in 1814, 1861, and 1920. After each of these peaks prices have fallen sharply and then more gradually for a period of years. Debt incurred during these periods of high prices has been repayable under the difficulty of using dollars of greater purchasing power and product returns of smaller debt-paying capacity.

is obtained from an established loan agency, this agency may limit the amount to a reasonable part of the value of the farm. But if a mortgage is given to the former owner in payment for land purchased it may represent practically the full selling price of the farm. As long as the land will sell for as much as the mortgage, the debt can be repaid by sale of the

property. Usually, however, farmers do not sell their farms, but keep them as homes. If land prices should decline, the mortgage should normally be of such size as to permit of renewal. Particular caution in assuming mortgage debt is necessary when prices are high. If a first mortgage represents half the land value when prices are high, renewal may be difficult when prices are low, and for loans with higher ratios renewal may be impossible. When land values are low, loans more closely approaching sale values may be justified.

Assurance that the farm, under proper operation, will carry the debt requires careful attention to the position and trend of the price level when the loan is made and to the term of years during which the loan is to run. If prices are high the farmer should, as far as possible, provide for such payment or reduction during the period of high prices as will make the debt of manageable proportions afterward. Since 1800, periods of decidedly high prices have been short, each period extending over a few years at most. (Fig. 200.) The abrupt rise of price peaks has been similar in each case and the subsequent drop has resulted in severe difficulty for heavily burdened borrowers.

### Customary Periods of Indebtedness

Except for amortized loans, the term of most mortgages is five years, but the average period of indebtedness for the encumbered farm is about 30 years. The debt-paying capacity of crops for each

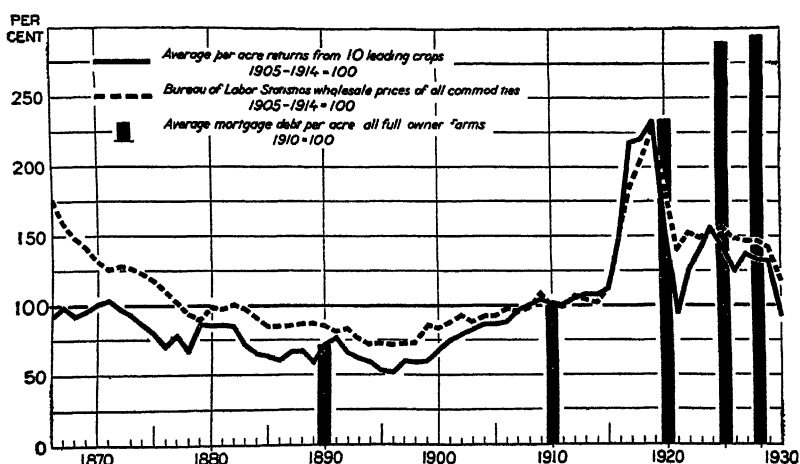


FIGURE 201.—Returns per acre of 10 leading crops, price level and average debt per acre. The value of returns from the 10 leading crops has shown a fairly close relation to the general price level from 1866 to 1929. The amount of indebtedness per acre of owner-operated farms also showed a close relation to the general price level from 1890 to 1920. Thereafter, however, the debt increased while prices fell. The result was an increased burden with the means of carrying it reduced nearly one-half. During sharp price rises heavy indebtedness can be incurred only with danger of later difficulty.

year since 1866, as shown in Figure 201, suggests the danger of contracting obligations during a period of high prices to be paid during years of low or average prices. Insufficient allowance for these factors during the war years and immediate postwar years has resulted in numerous farm bankruptcies and foreclosures.

Closely related to the amount to be borrowed is the method by which the debt is to be paid. Periodic reductions in the principal of the loan may be by an amortization plan whereby the debt is entirely paid through a long period of years, or by annual payments on loans running for a shorter term of years. When there are no provisions for such payments in the contract the farmer may attain the same end by setting aside from current farm returns amounts to be applied on the principal of the debt. In addition to having the merits of systematized saving, periodic payments lessen the danger from price

declines by retiring part of the principal with farm returns reflecting prices of products more nearly approximating the price level at which the debt was incurred.

### Cost of Mortgage Credit

The cost of mortgage credit warrants close attention because of the usually large sums involved and the substantial part that interest commonly takes from farm earnings. In most of the farming areas higher rates will occur on loans from local sources, and on loans representing large proportions of the value of the property. Additional cost may appear in the form of commissions and fees, and in a higher sale price for land purchased when a large part of the consideration takes the form of a promise to pay.

The wise use of farm-mortgage credit requires that the farmer consider many long-term economic factors and many questions about the source of the loan as well as the terms and conditions involved. There is no other way, however, of borrowing with safety sums large in relation to the value of the security, unless the borrower has other unencumbered resources upon which he can rely. A large proportion of the cases of financial disaster that have overtaken farmers during the last decade have been caused by failure to weigh correctly the dangers as well as the benefits involved in the use of farm-mortgage credit.

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# NEW USES FOR FARM PRODUCTS

## CHEMICAL UTILIZATION OF FARM BY-PRODUCTS HAS LARGE PROSPECTS

The products and by-products of agriculture have been used in the preparation of chemical substances since prehistoric times. Starch, separated from roots and cereal grains by crude processes of milling, was one of the earliest organic chemicals prepared by man. Alcohol, as a constituent of wine and other fermented beverages, is another example of a very early chemical product, although its separation from its dilute solutions into pure concentrated form for industrial uses came about only after the discovery of the art of distillation.

A careful distinction must be drawn between agricultural-chemical products which are of primary origin and those of secondary origin. The products in the first group are produced directly by the plant or animal; cellulose, starch, sucrose, lactose, dextrose, citric acid, tartaric acid, fat, and protein are examples of this very large primary group. The products of secondary origin are obtained from the primary group by some process of chemical modification such as fermentation, dehydration, hydrolysis, oxidation, reduction, or destructive distillation. Alcohol, acetic acid, lactic acid, furfural, glycerol, dextrine, and methanol are examples of familiar chemicals belonging to this secondary group.

With the great advancement in synthetic organic chemistry during the past half century, it is possible to manufacture from inorganic materials many chemicals, originally derived from plants or animal substances. Several once-important agricultural industries, with long-established histories, have been forced out of existence by their inability to compete with synthetic chemical products. The cultivation of indigo, for centuries a leading agricultural industry of India and other tropical countries, has been almost completely eliminated by the introduction of synthetic indigo. In a similar way the cultivation of madder, at one time an important crop in various European countries, was obliged to retire upon the advent of the synthetic dyestuff alizarin the tinctorial principle of the madder plant. Great privations among certain agricultural populations were caused by the industrial revolutions which chemistry was thus bringing about. The loss of indigo and madder cultivation to agriculture was a fundamental loss, for the raw material from which these dyestuffs are synthesized is coal tar—a substance of mineral, not agricultural, origin.

### Greater Achievements in Prospect

The ability of man to duplicate the products of nature in the future gives promise of even greater accomplishments than those that have been mentioned. The production of organic chemicals as a permanent outlet for agricultural raw materials would, therefore, appear at first sight to be somewhat hazardous, for no one can foretell the consequences of the new discoveries in chemistry. Industry will always seek the cheapest source of its raw materials, and the prices which the agriculturalist receives for his product must be sufficiently low to withstand the competition of synthetic chemistry. This challenge to the agriculturalist has been very strongly stated by a recent writer.

Either the prices of farm staples must be low or these new organic syntheses come into play. In other words, methanol, ethyl alcohol, formic acid, acetic acid, and many other compounds are readily procurable from the elementary sources of coal and petroleum which bid fair to displace the vegetable sources of present supply. Certainly it behooves those in agriculture to ponder well the outcome of this gigantic impending battle, and to keep ever before them the fact that throughout man's competition with Nature, synthetic chemistry has never lost a battle. In the light of modern advance in organic synthesis it is not at all unthinkable to picture the complete demolition of crop cultivation.

The picture as thus sketched is, however, somewhat overdrawn. Although it is true that man has succeeded in synthesizing upon a profitable commercial basis a number of organic compounds hitherto obtained from plant materials, the record of such victories is small in comparison with the immense number of substances used in industry, medicine, and the arts for which man must still go to nature. In fact the more serious thinkers among chemists recognize a limitation of man's powers and admit the impossibility of ever synthesizing so complicated a compound as insulin, or egg albumin, with molecular weights as great as 35,000. While the chemist, to an increasing degree will add to the number of his successes in the field of organic synthesis, mankind for many centuries to come must continue to rely upon plants and animals for his supplies of protein, oils and fat, starch, cellulose, and many other necessities, not to forget some of those more elusive but highly essential minor food constituents such as the vitamins.

### Farm Uses for Residues

Supplying our population with the basic necessities of food, clothing, and shelter, will continue, as in the past, to be the main object of agriculture, and the production of useful chemicals from agricultural raw materials will be largely confined to the utilization of the straw, stalks, chaff, culls, residues, and other by-products of the farmer's occupation. Even in the case of these residues the farmer must carefully determine whether they are not of more value to himself when converted into cattle feeds, fertilizers, or humus than when sold as raw materials for the manufacture of xylose, furfural, methanol, acetic acid, or other chemicals. Using them upon the farm as cattle feed or compost may in the end be more remunerative than selling to industry for a small pittance of cash.

Methods of using the cereal straws, the world's most abundant agricultural by-product, have attracted the most attention from chemists. In Europe straw is utilized upon the farm for composting, for thatching haystacks, barns, and other buildings, and also as a

cattle feed, for which purpose it has been subjected to various chemical treatments for increasing its digestibility. Straw is also used in Europe for manufacturing low-grade papers and is compressed into panels which are sold under the name of "thatchboard" for constructing the walls and partitions of buildings. Straw and cornstalks are also converted into building and insulating boards in the United States, but as raw material for this purpose they must compete with the waste of lumber mills. The destructive distillation of straw and cornstalks in producing carbon, illuminating gas, methanol, acetic acid, and other substances has also been done in the United States but not with complete economic success, since these products can be made more cheaply from other sources.

The most perfect chemical means for working up straw, stalks, hulls, and other cellular residues is the one that utilizes most completely each one of their three major components—cellulose, pentosans, and lignin. An estimate of the potential sources of cellulose, pentosans, and lignin in a few of the common agricultural residues of the United States is given in Table 11.

TABLE 11.—*Potential yields of cellulose, pentosans, and lignin in several agricultural residues of the United States*

Raw material	Annual production	Cellulose		Pentosans		Lignin	
		Per cent	Tons	Per cent	Tons	Per cent	Tons
Cereal straws.....	115,000,000	40	46,000,000	25	28,750,000	20	23,000,000
Cornstalks.....	100,000,000	50	50,000,000	21	21,000,000	20	20,000,000
Corncoobs.....	20,000,000	40	8,000,000	35	7,000,000	20	4,000,000
Cotton stalks.....	18,000,000	12	2,160,000	25	4,500,000	25	4,500,000
Cottonseed hulls....	1,800,000	40	720,000	38	681,000	20	360,000
Oat hulls.....	3,000,000	35	1,050,000	37	1,110,000	17	510,000
Flax straw.....	2,200,000	50	1,100,000	19	418,000	25	550,000
Sugarcane bagasse....	500,000	50	250,000	24	120,000	23	110,000
Peanut hulls.....	70,000	40	28,000	18	12,600	30	21,000

This rough compilation is far from complete, as it does not include potato vines, weeds, and many other forms of residues which are ordinarily burned as trash. The figures are sufficient, however, to give an idea of the immense resources of cellulose, pentosans, and lignin in the agricultural waste materials of the United States. Of these three ingredients the market for cellulose as a raw material for the manufacture of paper, rayon, nitrocellulose, and other industrial products, is at present the most extensive. The market for pentosans as a raw material for the manufacture of adhesives, xylose, and furfural is very restricted. Sufficient xylose can be made from a few tons of corncoobs or oat hulls to satisfy the present demands of the world for many years. One of the greatest services which the chemist can render agriculture is the discovery of new industrial uses for xylose and furfural, millions of tons of which can be manufactured each year from the pentosans in the residues of our cereal and other crops.

#### Lignin Market Limited as Yet

Lignin, the third major constituent of the straw, stalks, hulls, and other cellular wastes of agriculture, has at present a very limited market as a raw material for industrial utilization. The ultimate

possibilities in this direction seem, however, to be very great, and with reference to the utilization of lignin, synthetic chemistry stands to-day in about the same position as it stood over a century ago with reference to the utilization of coal tar in which such brilliant industrial achievements were later attained.

There is reason to suppose from the nature of its decomposition products that lignin may be the parent substance of the tannins, the flavones, the essential oils, and many other valuable aromatic constituents of plants. It remains for the chemist to discover the methods which the plant employs in converting lignin into these other substances and to duplicate them upon a large industrial scale. The working out of industrial methods for converting lignin into tannin would be of especial advantage not only for the utilization of a waste product but also for its aid in relieving the pending shortage of vegetable tanning materials. Experts of the Bureau of Chemistry and Soils are at present engaged upon this very important practical problem.

The monetary returns from the chemical utilization of agricultural by-products alone do not as a rule repay the expenses of production. They do, however, contribute substantially to increasing the total profits of a crop and have frequently helped to turn a deficit into a profit. Increasing the number of ways in which the products and by-products of agriculture can be utilized increases correspondingly the number of outlets into which crops may be diverted in times of surplus and overproduction.

The testing of the multitude of chemicals obtained from agricultural products for industrial uses is constantly disclosing unsuspected possibilities in their utilization. Ursolic acid, a new substance isolated from apple skins, by one of the department's chemists, has been found to greatly improve the gloss, water resistance, and brushing quality of cellulose lacquers. If there should be sufficient demand for this new chemical it would be possible to produce 500,000 pounds of it annually from the apple skins and pomace from cider factories, canning plants, and dehydrating establishments.

#### Even Weeds May Be Utilized

Even the weeds on the farm offer possibilities of chemical utilization. It has been demonstrated that goldenrod, one of the most widely occurring weeds in the United States, can serve as a raw material for the production of rubber. Neonicotine, a new alkaloid with valuable insecticidal properties, was first prepared synthetically from pyridine by one of the department's chemists. It has since been discovered as a natural constituent of the weed *Anabasis aphylla*, which grows plentifully in the eastern Mediterranean countries. This is one of the rare instances of the synthesis of a compound preceding its discovery in nature. It is as yet too early to predict whether the synthetic or the natural form of this new insecticide will establish commercial supremacy. In this connection it should be remembered that the ability of a plant to produce a chemical can be improved by propagation. The ancestral form of the sugar beet was an insignificant weed, its original 5 per cent or less of sugar having been increased by selective breeding to nearly 20 per cent.

Future developments in the chemical utilization of the surpluses and wastes of agriculture are dependent (1) upon creating new uses for the immense quantities of cellulose, starch, sucrose, lactose, xylose, furfural, acetic acid, oxalic acid, methanol, alcohol, and other substances which can be obtained by known methods from our present reserves; (2) upon discovering new methods for converting lignin and other undeveloped plant constituents into useful chemical derivatives. The synthetic chemist should be viewed by the agriculturist not as an enemy who is to accomplish "the complete demolition of crop cultivation" but rather as a valuable collaborator who will help the farmer to derive greater profits from the residues which at present are wasted or only imperfectly utilized.

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### CITRUS BY-PRODUCTS MARKET IS GROWERS' SAFEGUARD IN YEARS OF OVERPRODUCTION

Citrus fruit trees were brought to Florida by the Spanish padres several centuries ago, but the citrus industry is of much more recent origin. It was well into the latter half of the last century that commercial shipments in this country were well established, and it is only within the last 50 years that the industry has been on a substantial basis. In 1899, about 6,000,000 boxes of oranges, 30,000 boxes of grapefruit, and 900,000 boxes of lemons were shipped from California and Florida. In 1930, about 48,000,000 boxes of oranges, 14,000,000 boxes of grapefruit, and 7,000,000 boxes of lemons went to market from the citrus-growing States.

This enormous increase in production has naturally been accompanied by not a few problems. Among the most serious of these has been the utilization of the surplus and cull fruits. As production increases, the proportion of unmarketable fruit also increases, and as the saturation point of consumption is approached, there is great danger of loss on fruit in the lower grades. An unusually large crop is a disaster if no means are provided for keeping the low grades of fruit from the market.

A cooperative by-product industry can go a long way toward stabilizing markets at any time, but in years of overproduction, it becomes the only salvation of the grower. A striking illustration of this took place in 1927 in the lemon industry. With the consumption in the United States and Canada of less than 15,000 carloads, all but 2,000 of which came from California, the lemon growers of that State were faced with the problem of disposing of 6,000 additional carloads. Not only was this amount of fruit, 78,000 tons, handled by their by-product company with a satisfactory return to the growers, but nearly 13,000 carloads were marketed, with a gross return exceeded but once in the history of their cooperative enterprise. Had 1,000 carloads of the fruit which was turned into by-products been placed on the market, the crop would probably have yielded one of the poorest returns on record.

#### Lemon Growers Were the Pioneers

Curiously enough, the smallest group of citrus growers, those raising lemons, were the first to make a start toward solving the surplus and cull problems. The greatest consumption of oranges and grapefruit

has been during the winter and early spring months, whereas lemons are consumed largely during the summer. Their consumption depends upon weather conditions more than does that of other citrus fruits. A heavy crop of lemons coincident with a mild, cool summer meant disaster to the lemon growers before the by-product enterprise was established. Beginning in a small way, handling about 5,000 tons of lemons in 1917, the capacity and usefulness of this cooperative enterprise increased until, in 1927, the growers handled the largest amount of cull and surplus fruit ever produced in California. This fruit was converted into citrate of lime (from which citric acid is produced), essential oil of lemon, and pectin.

Citric acid is used in beverages, soda-water sirups, effervescent salts, and citrate of magnesia. The consumption is about 6,000,000 to 8,000,000 pounds per annum, of which about 20 to 25 per cent is supplied by citrus by-products operators. Essential oil of lemon is used for flavoring purposes and to a less extent in perfumes. Most of it is imported from Italy, about 1,000,000 pounds coming in annually. California produces about 10 per cent as much. Pectin is used by the manufacturers of jams and jellies to produce a satisfactory consistency in their product. It is contained in the peels of citrus fruits. The annual production is a matter of doubt as it is seldom sold pure, but, for the purpose of standardization, is either in solution in water or mixed with sugar. The citrus-fruit growers have sufficient material available to produce pectin to supply the world's demand.

Growers of oranges were slower in starting their by-products factory, but they too have come forward rapidly within the last few years. After failure to market orange marmalade on a scale that would use any considerable amount of fruit, attention was turned to other products, and a satisfactory business has been built up in making concentrated orange juice, essential oil of orange, and pectin. Carbonated orange beverages are popular, and large quantities of these products are consumed throughout the country. Recently, frozen orange juice has been made in Florida and California on a large scale, and quantities of surplus fruit have been used in this way. Several companies are doing a gross annual business of \$1,000,000 each in orange by-products.

#### Grapefruit Culls Utilized

By-products from grapefruit have so far been confined largely to the canned fruit and the canned juice, but as 25 to 50 per cent of the entire crop is annually consumed in this way, the cull, consisting of misshapen, thick-skinned, and otherwise unmarketable fruit, are returning something to the growers. Grapefruit peel contains both essential oil and pectin, but there has been no commercial production of either from this source.

Up to the present the oranges and lemons used for by-products do not return to the grower the cost of production, and no grower contemplates growing the fruit for by-product purposes alone. The actual cost of growing lemons in California is about \$35 a ton, but returns of more than \$25 a ton from by-product utilization are rare. Although the cost of producing oranges is somewhat less than that of producing lemons, the returns from their use as by-products are not enough to pay for growing the fruit. Canned grapefruit will probably come nearer to paying its way than will the by-products of either of the other citrus fruits.

E. M. CHACE, *Bureau of Chemistry and Soils.*

## LIGNIN, FARM BY-PRODUCT, NOW WASTED, MAY SUPPLY CHEAP ORGANIC CHEMICALS

The various by-products of the agricultural industry, such as cereal straws, cotton stalks, corn stalks, and hulls, are composed principally of carbohydrates, chiefly cellulose and pentosans, and a substance called lignin. The quantity of lignin in the agricultural by-products listed above ranges from about 15 to 20 per cent of the dry weight of the materials. Approximately 225,000,000 tons of these agricultural by-products are produced annually on the farms of this country. This gives some conception of the potential supply of this substance. In addition to this, about 1,200,000 tons of lignin are produced annually in the paper mills of this country as a by-product in the preparation of wood pulp. At present most of this lignin is wasted.

The fact that lignin now constitutes an enormous industrial and agricultural waste, and because of its inherent possibilities as a cheap and abundant source of organic chemicals, has stimulated great research activity all over the world on its fundamental chemistry. It is now generally recognized among students of this subject that only after a proper understanding of the chemistry of lignin will it be possible to develop a rational program for its economic utilization. Attempts to utilize lignin by empirical methods, which were used in the past, have met with failure.

### Lignin Related to Phenols

Investigations on the fundamental chemistry of lignin conducted by the Bureau of Chemistry and Soils have shown that the substance is chemically related to phenols. In view of the fact that ordinary phenol or carbolic acid is now used extensively in the preparation of synthetic resins, it seemed, by analogy, that lignin also would yield synthetic resins. As a matter of fact, it was found that under suitable conditions lignin will combine with furfural and with aromatic amines, such as aniline, dimethylaniline, ortho and para toluidine, cymidine, ortho and para nitraniline, meta toluylenediamine, benzidine, toluidine, and alpha and beta naphthylamine, forming resinous products that range in color from brown to black. Tests conducted on these resins indicate that they may be used in the preparation of varnishes. All the resins, with the exception of that obtained from furfural and lignin, belong to the soluble and fusible type.

When lignin is subjected to dry distillation it yields a series of organic compounds, such as guaiacol, creosol, normal propyl guaiacol, catechol, and vinyl guaiacol. Most of these substances possess antiseptic properties, and some of them, like guaiacol and catechol, are used to a considerable extent in the pharmaceutical and chemical industries. In addition to these compounds, other organic substances, such as wood alcohol, acetone, acetic acid, and anisic acid, have been obtained as products of distillation.

With the broadening of our knowledge of the fundamental chemistry of lignin, further developments in its economic utilization may be anticipated.

MAX PHILLIPS, *Bureau of Chemistry and Soils.*

## FURFURAL, A PRODUCT OF FARM WASTES, HAS MANY INDUSTRIAL USES

The name "furfural" is derived from that of another farm by-product. One of the early investigators of furfural, which was first obtained in 1830, prepared it from bran and gave it its name, the literal translation of which is "bran oil." All farm wastes are composed chiefly of cellulose, lignin, and pentosans. Furfural is made from the pentosans. It may be produced by moistening ground corn-cobs with acid and water and heating the mixture. Furfural and water distil off together, and the furfural is then separated from the water.

Although furfural has been known for many years, it was until recently only a chemical curiosity selling for \$30 a pound, at which price it was obviously of no concern to industry. About 10 years ago the problem of its production was taken up in the Department of Agriculture, and studies of the possibility of manufacturing it from corn-cobs were made. Yields were investigated, and special apparatus was devised. These studies demonstrated that furfural might be produced for industrial uses at a price which would make it readily available. As a result, the commercial manufacture of furfural from oat hulls was started, and it is this development which is responsible for the present production of furfural for the market. As a raw material, oat hulls are preferred to corn-cobs, chiefly because they are already in the factory as a by-product from the production of various foods. Since the cost of collecting is one of the biggest items of expense in the industrial use of any farm waste, the fact that oat hulls are on hand makes them a cheaper raw material.

Beginning with the first production of furfural for the market, up to and including 1929, its production has doubled every year, with a corresponding decrease in price, so that it can now be obtained in large quantities for about 10 cents a pound.

### Commercial Uses of Furfural

Furfural has found a number of commercial uses. First and most important is its use in the manufacture of synthetic resins. When furfural is combined with a number of coal-tar by-products and heated, it forms a hard, shiny material which can be molded into various shapes. This is especially useful because of its insulating value. As furfural is rather unstable and becomes discolored when exposed to the air, it is not suited to the production of the lighter-colored resins. It is an excellent preservative, though its susceptibility to discoloration precludes many uses of this kind. Furfural is also employed commercially as a solvent. It is of value in the purification of rosin, because the impurities which discolor rosin in the natural state are highly insoluble in furfural. It is claimed that it may be similarly employed in the purification of anthracene, an important raw material for vat dyes. Furfural has been recommended as an ingredient of commercial lacquers, and it is now being used to a certain extent in the preparation of these substances. It also forms a number of compounds which can be used in the manufacture of rubber. A number of dyes have been made from furfural, but these are inferior to those made from other materials now in use. Furfural is an outstanding example of the possibilities that lie hidden in the by-products of the farm.

H. T. HERRICK, *Bureau of Chemistry and Soils.*

## UTILIZATION OF STRAWS AND STALKS LAGS AS OTHER MATERIALS COMPETE

In the production of the great staple crops, the small grains, the cotton, the sugar, and the timber of this country, there necessarily is grown an equal and usually greater tonnage of straws, stalks, cane, lap wood, and bark, for which in the main there is no large use, except as roughage, as fuel at the sugar houses, and in maintaining the fertility of the farm. A comparatively small percentage is sold for industrial uses, such as bedding for animals, paper making, board making, tanning, and the production of certain chemicals, such as acetic acid, alcohols, acetone, charcoal, and wood oils.

Practically ever since its organization the Department of Agriculture has been investigating methods of utilizing these waste products of the farm, and has been familiar with the efforts of others to develop uses for them. The fact that production of the staple crops which are the backbone of American agriculture, has increased, that prices are below the cost of production, that the farmers themselves are in the most difficult economic position occupied by any class of American people, has led again to an intense effort to utilize more extensively in industry the by-products of the farm, and has caused increased research and informational activity in the Department of Agriculture.

If and when they can be profitably and competitively utilized industrially, these farm by-products will have great value. The straws of wheat, oats, barley, rye, and rice, the stalks of corn and sugarcane, and the wild marsh grasses produced in this country annually, probably exceed 260,000,000 tons. This tremendous quantity of lignocellulose material is more than enough to make all the paper, fiber board, acetic acid, alcohols, acetone, and charcoal required by this country. At present these commodities are being made mostly from other raw materials, principally wood and corn, and under present economic conditions they can be produced more economically from those materials. Potentially, farm and town buildings can be lighted, and cooking can be done, with fuel made from farm by-products. Then why isn't it done? Why has not the Department of Agriculture, which has known of these problems for 50 years or more, solved them and pointed the way to the profitable utilization of these wastes?

### No Market as Yet

Each year top and lap wood, and tan bark having a potential or theoretical value of millions of dollars, rot or burn on the farms or in the forests of this country. Again, why? The answer is clear cut and conclusive. With the exceptions cited below it does not pay to gather these wastes and try to sell them. There is no market for them. Nobody wants them because the things that can be made from them can be made more economically and more easily from something else.

When these wastes have a market use it is limited and is readily supplied by only a small percentage of the amount available. This is the case of waste woods used in making paper, insulation board, acetic acid, wood alcohol, acetone, charcoal, and wood tars; waste barks used in tanning; straws used in making straw and insulation board, and sugarcane and cornstalks used in making insulation board. The

total quantity of these wastes used industrially is almost negligible, and it yields the farmer but little profit.

The only industrial outlets for the above-mentioned farm products that have so far proved practicable and that give promise at this time of continuing are the utilization of waste woods for paper and board making and for certain chemicals; and to a limited extent the utilization of waste barks and woods for tanning and of waste straws, corn-stalks and sugarcane stalks for making box, insulation, and building board.

Apparently these uses have possibilities of growth and perhaps of tremendous expansion. Other potential uses, although viewed with longing eyes by the farmer, and attractive and stimulating to the research worker, must await further development or perhaps more favorable economic conditions before the Department of Agriculture can recommend them to the farmer or to the business man. The Bureau of Chemistry and Soils and other bureaus of the department are constantly seeking profitable industrial uses for the by-products of the farm and forest, and will promptly make such uses known when they are developed.

F. P. VEITCH, *Bureau of Chemistry and Soils.*

## SWEETPOTATOES YIELD FINE WHITE STARCH BY A NEW PROCESS

Although cornstarch dominates the starch market in the United States, there is still a consistent demand for some other starches, which, on account of their distinctive properties, are preferred for certain purposes, those of high quality often bringing a premium. In this group are potato and cassava starches, of which there is imported each year an average of approximately 130,000,000 pounds, having a value exceeding \$6,500,000.

In any plan for utilizing a farm crop as a source of starch, it is best to consider the possibility of producing a starch that will compete with imported rather than with domestic starch; furthermore, those crops which are now produced in abundance, or which could easily be expanded, should be considered before introducing a crop the success of which might be in some doubt. From this standpoint the principal crops of consequence from which starch could be produced in competition with imported starch are potatoes and sweetpotatoes.

### Methods of Utilizing Cull and Surplus Potatoes and Sweetpotatoes

The problem of profitably utilizing cull and surplus potatoes has received the attention of several investigators, but no entirely satisfactory scheme has been evolved. The potato-flour industry which sprang up as a result of war conditions has now largely disappeared because of limited demand. Canning has held some promise as a means of utilizing both oversize and undersize cull sweetpotatoes, but since fresh potatoes are now available during practically the entire year as a result of improved methods of storage and distribution, the average yearly pack of canned sweetpotatoes appears to be declining. The production of sirup from sweetpotatoes has been suggested, but

has not proved to be commercially practicable. The use of cull potatoes as stock feed, particularly for hogs, has some merit but, in general, the centers of hog production and of potato production do not coincide, so that this method of utilization is limited. The possibilities of utilizing the cull and surplus portions of these crops are thus apparently narrowed down to the production of starch or its derivatives.

In contrast to the practice in European countries where potatoes constitute the principal source of starch, there are in this country only a few small and simply equipped potato-starch factories. In view of certain factors, such as the premium in price at which potato starch of high quality sells, the extent of importation of potato starch, the recent increase in the tariff rate, and the possibility of utilizing sweetpotatoes as well as potatoes, it would seem practicable to extend the potato-starch industry in this country, particularly for production of high-grade starch. Locating starch factories in overlapping production areas of these two crops should aid materially in stabilizing the supply of raw material and in extending the manufacturing season, thus remedying two conditions which have been regarded as serious obstacles to an extension of the potato-starch industry.

Heretofore when the potato-starch process has been used, difficulty has been experienced in consistently obtaining a prime white starch from sweetpotatoes. As a result of recent investigations by the Bureau of Chemistry and Soils, it is now possible to produce a white starch of high quality from sweetpotatoes of any variety. It was found that objectionable pigments may be eliminated by a process which is somewhat similar to that used in the production of cornstarch and which involves the use of sulphurous acid and caustic soda. The principal function of the sulphurous acid is to keep certain pigments associated with the starch in reduced and colorless condition and to prevent oxidase action which is accompanied by pronounced darkening of the extraction liquors. The function of the caustic soda is to extract, after treatment with sulphurous acid, certain pigments which affect the quality of the starch.

### Process for Sweetpotato Starch Production

The process of producing starch from sweetpotatoes consists of the following steps: The sweetpotatoes are washed and transferred to a grinder, where, after the addition of a 0.15 per cent sulphurous acid solution, they are pulped. Shaking or brushing screens are used for separating the starch from the pulp which, for high extraction, is again ground and rescreened. The separation of the starch from the water may be accomplished by allowing it to settle in tanks or tables, but it is preferable to use a continuous centrifugal machine. The starch is purified by being retabled two or three times and afterwards receiving a carefully controlled alkali treatment. The starch is stirred with the alkali for a few hours, after which it is allowed to settle overnight. It is then suspended in clean water, retabled, filtered, and thoroughly washed. In order to insure neutralization of all the alkali, the starch is suspended in a very weak acid solution (sulphurous or acetic acid) and is again filtered and washed. The starch from the filter is then ready for drying, after which it may be ground, sifted, and packed.

A complete pilot starch plant, erected by the Bureau of Chemistry and Soils at the Arlington Experiment Farm at Rosslyn, Va., has been

used to test thoroughly the process described above. A general view of the equipment is shown in Figure 202.



FIGURE 202 — Experimental starch plant, Arlington Experiment Farm, Va., showing tower tank, vacuum-filter outfit, tables, large tank and steep tank, and brushing screen

### Properties of Sweetpotato Starch

The starch granules of sweetpotatoes are considerably smaller than those of potatoes, and a little larger than those of corn. Sweetpotato starch has a rather high gelatinization temperature and pastes prepared with water are much more stable on long heating than are potato-starch pastes. This is a valuable property in the sizing of cotton textile goods. The alkali pastes of sweetpotato and potato starches are about equally viscous. Sweetpotato

starch made by the method described was approximately equal in purity to commercial starches of the finest quality found on the market.

R. T. BALCH and H. S. PAINE, *Bureau of Chemistry and Soils.*

## FREEZING TO PRESERVE VEGETABLES AND FRUITS STILL IN PIONEER STAGE

The natural preservation of plant and animal tissue by freezing was undoubtedly observed by man for centuries before he discerned in this phenomenon anything useful in his daily life. In historical times atmospheric low temperatures, snow, and ice, began to be used for the cooling of foods and drinks to temperatures that made them more agreeable to the taste, discouraged development of the organisms of spoilage, and delayed decomposition.

For many years these natural refrigerants have been used more or less satisfactorily. Recent progress in mechanical refrigeration, together with changes in modern food-distribution practices, has greatly popularized the idea of everyday domestic refrigeration and has now brought preservation by freezing into striking prominence.

The youth of this industry, as compared with the century of experience gained by the canning trade, which employs heat as the preserving agent, will suggest that the pioneering stage has not yet been passed. Many problems remain to be solved or are only partly understood. The stimulus for sustained and enthusiastic public interest in this new business arises partly from the fact that, in many instances, freezing preservation enables the consumer to have horticultural products in a condition as nearly equal to their fresh state as it seems possible to obtain them by any preservative means.

As a first consideration in successful preservation by freezing, emphasis must be laid upon the close relationship between the horticultural character, varietal peculiarity and maturity of the raw materials, and the final quality of the finished product. Fully ripened, sound fruits, washed in clean water and prepared for freezing under sanitary conditions with a minimum of delay, are essentials to a satisfactory product intended for freezing preservation.

Fungi, yeasts, and bacteria are almost universally present on fruits and vegetables in their natural state, and the activities of these as well as the life processes of plant tissues are materially hastened by higher temperatures such as generally prevail during the packing of the products. Hence any reduction in air temperatures, particularly to 40° F. or below, during the time required for preparation of the material is distinctly helpful.

Freezing temperatures do not necessarily terminate these life activities but do very materially retard them. When thawing takes place, some of these processes may be resumed with equal or even greater intensity than before freezing occurred. Discoloration of plant tissues by oxidation is such a phenomenon, one of much commercial significance, particularly for frozen fruits in small containers.

### The Lessening of Discoloration

This discoloration may be prevented or lessened by several means, some of which are designed to exclude atmospheric oxygen from contact with the tissues, or to inactivate the organic ferments responsible for discoloration. The choice of a variety of fruit or vegetable best suited to freezing preservation may be very helpful not only in minimizing oxidation in fruits but also in improving the texture and the desirable culinary and dessert qualities of frozen horticultural products generally.

Blanching treatments at moderately hot temperatures have been effective in lessening the decomposition in freezing storage of such vegetables as peas, in improving the texture of spinach held at freezing temperatures, and in reducing the activity of oxidation ferments in such fruits as apricots and peaches.

Exclusion of air from the product is accomplished by a relatively high vacuum closure of glass or tin containers or by replacing the air in the head space by some gas such as carbon dioxide or nitrogen, the presence of which tends to suppress the activities of the organisms requiring air for life and development as well as to inhibit the completion of the oxidation cycle.

### The Use of Sirups

Covering fruits with sirups of 40 to 65 per cent concentration while the temperature of the products is being lowered, has several advantages. The sirup tends to exclude air from the fruit surface, and in the case of small fruits such as strawberries and raspberries it makes less essential the use of a vacuumized container to prevent discoloration of the product. (Fig. 203)

With some vegetables such as peas and beans a relatively weak brine, similar to that used for the product in heat processing, has been found to give a product superior in texture and culinary quality.

Sirup, if the concentration is fairly high, protects the fruit product against fermentation and spoilage. The natural color and flavor of many fruits seem to be better retained when sirup or sugar is present, and as a result of the gradual removal of water from the tissues, due to the action of the sirup on them, the fruits seem to be better prepared for the extraction of water, which takes place with some rapidity when ice formation sets in. As a result of this, the texture of the frozen product is improved when the fruit is thawed before it is used.



FIGURE 203 —Strawberries and peaches frozen in sirup

Although considerable discussion has recently been devoted to the merits of very rapid freezing in producing frozen horticultural products of high quality, there is some evidence that other factors besides the size and frequency of the ice crystals in the tissues are important in determining the ultimate quality of the product. In addition, very rapid freezing of plant products generally requires relatively expensive refrigerating equipment. It has been found from experience with the product after it is frozen as well as from the standpoint of economy that the use of temperatures of 0° to 10° F. for freezing horticultural products in small containers is preferable to the use of lower temperatures. This is particularly true when the freezing operation is so modified that the containers are exposed individually to the refrigerant, and preferably while in motion, thereby facilitating heat transfer from the product to the freezing medium, inducing relatively quick and even ice formation and allowing a satisfactory distribution of the sirup or brine in the product.

The best storage conditions for frozen plant products are not completely understood, but experience has shown that temperatures of 10° to 15° F. are reasonably satisfactory for most purposes.

### Slower Progress in Vegetable Freezing

While the freezing of fruits such as strawberries, raspberries, and some varieties of cherries in small containers has been done commercially for several years, and even such light-colored tree fruits as apples, apricots, and peaches can now be purchased frozen in the food markets of the country, the freezing preservation of vegetables has gone ahead more slowly. The main reason for this is probably the present lack of information on the behavior of certain food-poisoning bacteria, such as the one causing botulism, when exposed to the temperatures and other conditions of freezing preservation. There is some evidence that freezing may weaken or kill the microorganisms responsible for fermentation and spoilage in frozen fruits. In the absence of such information about the spoilage organisms in vegetables it is safer to pack such products for freezing only under carefully supervised conditions and only where they will be marketed under conditions permitting the education of the consumer in correct methods of handling and utilizing the frozen food.

The proper distribution and use of frozen fruits and vegetables involves such distinctly new viewpoints of food utilization that it is probably desirable to exercise some restraint in applying this new method, and thus to avoid costly mistakes and wasted effort. Research and experience over a period of years should gradually make it possible for this young industry to develop to the proportions that its usefulness deserves.

H. C. DIEHL, *Bureau of Plant Industry.*

### FRUIT PRESERVATION BY FREEZING PRESENTS MANY PROBLEMS FOR RESEARCH

Small fruits preserved by freezing storage more nearly approximate the fresh fruits in color and flavor than do fruits preserved by other means. Preservation by freezing began about 20 years ago when the berry packers of the Pacific Northwest started experimenting with the preservation of berries by the frozen-pack method. This consists essentially in placing the fruit in barrels or other containers, with or without sugar, then freezing and storing the pack at relatively low temperatures—about 0° F. or a little below for the freezing and about 10° for storage. Most of the berries thus preserved are used in preserves, jellies, jams, marmalades, soda-fountain supplies and ice cream, and in pies and other pastries. More than 100,000 barrels of the 50-gallon size are being sold annually. The popularity of the frozen fruit is well attested to by the fact that of approximately 17,000,000 pounds of cherries handled by one of the Wisconsin fruit growers' unions in 1930, only about 8,000,000 pounds were sold as fresh fruit.

A great deal of research on preserving fruits by freezing has been done in the last two years. Fruits put up in containers holding 1 pound and less have appeared on the market. There has been a tendency to freeze these small containers at lower temperatures, anywhere from -20° to -50° F., as quick freezing retards enzymatic processes and also forms small ice crystals, which do not injure the tissues so much as do the larger crystals formed by freezing at higher temperatures.

Freezing does not kill bacteria, yeasts, and molds, which are among the causes of spoilage in fruit, but it arrests their development, and as long as the product is kept frozen they do not become active.

A great deal is still to be learned about preserving fruit by freezing. There is as yet no common agreement on the best temperatures for freezing and storage, and at present all fruits do not lend themselves readily to freezing storage. Methods of retail distribution must also be worked out. The technological phases of the problem are being investigated by the Bureau of Chemistry and Soils.

ROBERT P. STRAKA, *Bureau of Chemistry and Soils.*

# FERTILIZER DEVELOPMENTS

## FERTILIZER INDUSTRY MAKING ADJUSTMENTS TO COMPLEX ECONOMIC REQUIREMENTS

Fertilizers as a means of increasing total crop production have little appeal under present conditions of agriculture, with large surpluses being produced in many instances at a cost exceeding the value of the products. As a means, however, of reducing the cost of production, they are of special interest. That the cost of fertilizers to the farmer might be reduced, the elimination of inert materials accompanying the plant food elements has long been advocated; but, primarily because of the nature of the materials available, this could not be accomplished. Improvement in commercial fertilizers has gradually gone forward but the greatest advance has been made since the World War.

The earlier industry was founded on the exploitation of natural deposits of phosphates, nitrates, and potash, and on the utilization of waste or by-products from other industries, so that the technology of the industry prior to the twentieth century consisted principally of hand mixing of the various available materials. The only chemical process involved was the manufacture of sulphuric acid used in converting phosphate into superphosphate. The principal part of the industry was in assembling and mixing the materials and in distributing the products. Mechanization of the plants and, in many instances, combination of sulphuric acid and superphosphate manufacture with mixing and distribution plants, were natural steps in the development.

### Character of Goods Produced

Under this system the total of plant-food constituents in mixed fertilizers was limited to about 20 per cent because of the low percentage of these constituents in many of the basic materials, none of them carrying over 20 per cent with the exception of some of the potash salts. The treatment of phosphate rock with sulphuric acid gave a product with one-half the phosphoric acid content, diluted with calcium sulphate. Materials obtained as by-products from other industries were diluted by accompanying substances, which in the great majority of cases were of little crop-producing value. When more concentrated materials were available, the mixtures were diluted with filler to make them correspond to the customary formulas.

### Influence of Nitrogen Fixation

The Fertilizer and Fixed Nitrogen Unit of the Bureau of Chemistry and Soils and its predecessors in the Bureau of Soils and the Fixed Nitrogen Research Laboratory, have been engaged for a number of years on problems involved in the production of concentrated fertilizers, including the fixation of nitrogen and the conversion of nitrogen products into substances suitable for fertilizers. The development of nitrogen fixation since the war has exerted a profound influence on the fertilizer industry and is transforming it into a chemical manufacturing industry. Before the war calcium nitrate and calcium cyanamide were the only fixed-nitrogen products entering American fertilizers, but since they could be used in only a limited amount, their effect on the industry was small. Since 1918, however, the production of ammonia by the direct synthetic method has made it possible to prepare a number of materials of high concentration containing one, two, or even all three of the principal fertilizer elements. The products from the nitrogen-fixation industry are characterized by concentration. Ammonia is the most concentrated nitrogen product, but since it can not be employed directly, it is transformed into products suitable for fertilizer use. By oxidation it is transformed to nitric acid. From nitric acid, with limestone, calcium nitrate is formed; and with soda ash, synthetic sodium nitrate. Ammonium nitrate is formed by combination of ammonia with nitric acid, or ammonium sulphate with sulphuric acid, and ammonium phosphates with phosphoric acid. Various combinations of these with each other and with potash salts are being produced or are suitable for utilization as fertilizers.

The development of more concentrated phosphates has been going forward simultaneously. The production of triple superphosphate for fertilizer use has been a reality for years and the production of phosphoric acid both by furnace processes and by chemical means gives promise of its more extensive employment in the near future as a carrier for the other two fertilizer elements. This use is already an actuality, but expected developments in the production of cheaper phosphoric acid will accentuate the employment of ammonium and potassium phosphates and similar compounds. A further recent development has been the direct addition of ammonia to superphosphate, whereby part of the phosphate is transformed into ammonium phosphate. The addition of ammonia is limited to rather small percentages but the increase in plant-food content is quite advantageous.

### Higher-Analysis Fertilizers

The availability of more concentrated materials is resulting in the production of mixed fertilizers of higher concentration. While it was not advantageous and often not possible to make mixed goods of high concentration with materials from the older sources, with the new synthetic materials, mixtures carrying as much as 70 to 75 per cent of plant food may be made. A change to the production of more concentrated fertilizers is taking place as is evidenced by the fact that the average plant-food content of fertilizers in the United States in 1914 was about 12 per cent, while in 1930 it was 18 per cent. (Fig. 204.) This 50 per cent increase in plant-food content represents an increase of 486,500 tons of actual plant food in the fertilizer consumed in 1930 over what would have been contained in the same tonnage of

12 per cent fertilizer. Or it means some 4,000,000 fewer tons of mixed fertilizer to handle and on which to pay freight, than would have been necessary with 12 per cent goods. At an average freight charge of \$3 per ton, this is a saving of over \$12,000,000. With higher concentrations the savings will be increased proportionately.

### Concentrated Fertilizers

The present day high-analysis fertilizers are only a step in the production of concentrated fertilizers. They may be made up from high-grade materials handled in the same way as the low-analysis goods, but the production of concentrated fertilizers involves new adjustments in manufacture, the solving of distribution and handling problems, the determination of agronomic relations

and the education of the farmer in their use. That these changes are gradually taking place is revealed by a comparison in Table 12 of the new materials with the earlier materials employed.

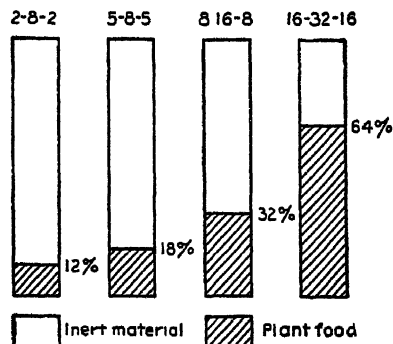


FIGURE 204.—Relative amounts of plant food and inert materials in ordinary, high analysis, and concentrated fertilizers.

TABLE 12.—*Comparison of sources, composition, and other characteristics of older and newer fertilizer materials*

Type of material	Source	Composition			Remarks
		Nitrogen	Phosphoric acid	Potash	
		Per cent	Per cent	Per cent	
<b>Older materials:</b>					
Sodium nitrate.....	Chile.....	15-16			
Sodium sulphate.....	Gas plants and coke ovens.....	20			
Blood.....	Animal refuse.....	13-15			
Taggite.....	do.....	13-12			
Cottaged meal.....	Oil mills.....	7-8	2-3	1 3-2	
Fish scrap.....	Fish.....	7-10	5-7		
Garbage.....	City waste.....	0.1-1.4	2 25-4 25		
Bone meal.....	Animal refuse.....	2-3	14-18		
Superphosphate.....	Phosphate rock.....			50	
Potassium muriate.....	do.....			48-51	
Potassium sulphate.....	do.....			25	
Manure salt.....	do.....			14	
Kainit.....	do.....				
<b>Newer chemical products:</b>					
Sodium nitrate.....	Germany and United States.....	16			
Calcium nitrate.....	France and Norway.....	13			
Do.....	Germany.....	16.5			
Calcium cyanamide.....	Germany and United States.....	20 5-25			
Ammonium nitrate.....	Germany.....	34-35			
Urea (Florinid).....	do.....	46			
Cal-urea.....	do.....	34			
Urea-phos.....	do.....	18	45		
Potassium nitrate.....	do.....	13.5		46	
Cal-nitro.....	do.....	20.5			
Leuna salt peter.....	do.....	26			
Ammonium sulpho-nitrate.....	France.....	25.5			
Amorphos.....	United States.....	13	48		
Leunaphos.....	Germany.....	20	20		
Phosphazote.....	France and Switzerland.....	20	12-15		
Treble superphosphate.....	United States.....	7-12	45-47		
Diammonium phosphate.....	do.....	23	47		
Potassium-ammonium nitrate.....	Germany.....	16		25-28	
Nitrophoska.....	do.....	15-17.5	11-30	15-25.5	
Ammoniophosko.....	United States.....				

Naturally occurring, or by-product and waste materials.

From chemical processes:

Nitric acid added to sodium carbonate.

Nitric acid added to calcium carbonate.

Nitric acid added to 5 per cent ammonium nitrate.

First fixation product used as fertilizer.

Ammonia and nitric acid.

Ammonia and carbon dioxide.

Urea and calcium nitrate.

Ammonium nitrate added to calcium carbonate.

Ammonium nitrate added to ammonium sulphate.

Do.

Ammonium phosphate and sulphate.

Diammonium phosphate and ammonium sulphate.

Phosphate rock added to phosphoric acid.

Ammonia and phosphoric acid.

Ammonium nitrate added to potassium chloride.

5 formulas from mixtures of diammonium phosphate, ammonium nitrate,

or urea and potassium chloride or sulphate.

Mixture of Amorphos, potassium sulphate, and ammonium sulphate.

As a chemical industry, the manufacture of fertilizers is related to highly technical processes as the source of materials and to agriculture in the disposition of its products. The industry must meet the competition of older materials as well as that of new chemical processes and better methods of manufacture. The consumption and distribution of its products will be determined by the relation of their prices to those of agricultural products as well as by the efficiency of the goods in crop-producing power, while existence as a chemical industry will depend upon production costs at least as low as those of the natural materials. Intensive study of problems associated with concentration is being made by the Fertilizer and Fixed Nitrogen Unit of the department and by various other agencies in this country and abroad. The preparation of concentrated fertilizers was initiated in this country and their utilization has been taken up in other countries, especially Germany. The advantages of the concentrated materials are apparent, and their extensive employment here will gradually follow the solving of problems encountered under American conditions.

R. O. E. DAVIS, *Bureau of Chemistry and Soils.*

#### FERTILIZER SOURCES AMPLE FOR MIDWEST, COST CUT BY HIGHER CONCENTRATION

The American farmer, in his agricultural operations, applies 8,000,000 tons of fertilizers annually. It is frequently pointed out that this is an average application of 40 pounds for each acre of land under cultivation in this country, as contrasted with 500 pounds for the Netherlands, where intensive farming is generally followed. But it is not necessary to go to Europe to find comparisons, for in this country there are even more widely divergent fertilizer practices between the Southeast and the Middle West, as illustrated by comparing Florida, with an average of 794 pounds per acre, with Kansas, with an average of only 1 pound per acre.

To account for this wide divergence, many factors must be considered. Some are the nature of crops, soil types, and geographical locations with respect to sources of fertilizer supply. While the staple crops are different in the different regions, yet there are few crops that do not respond to fertilizer use. While there are differences in soil types, yet there are few soils on which fertilizers do not give good results. Native fertility is no absolute safeguard against soil depletion, as has been amply demonstrated in agricultural experience. Unless provision is made for restoring to the land the plant food lost through the activities of various agencies, the best of soils may decrease in productivity through loss of some element of its fertility.

To prevent soil exhaustion is a function of fertilizers. To conserve labor, to permit the production of a crop unit with a reduced land unit and labor unit, in other words, to produce a crop unit at a reduced production cost, is the function of most immediate interest to the individual farmer.

Can there be any geographical limitation to these functions? Are they not of the same importance to the Middle West as to the Southeast? In accounting, therefore, for this wide divergence in fertilizer use, can the answer be found in sources of supply of fertilizer materials, and if so what can be done to meet the latent fertilizer requirements of the Nation's greatest agricultural region?

### Effect of Transportation Costs

It is more than a coincidence that in the Southeast where fertilizers are more generally used, by far the greater part is manufactured from close-by sources of phosphates, in Florida and Tennessee, and of synthetic and by-product ammonia, while at the various seaports, European potash is delivered by low-cost water transportation. It is estimated that the freight paid on the 8,000,000 tons of fertilizers used annually is at the average rate of \$3 per ton. It is obvious that this rate mounts as distribution is attempted over regions more remote from production points.

Using present sources, the Middle West must look to Florida and Tennessee or to a single production unit in Montana for its phosphates, to the Atlantic or Gulf seaboard for its nitrates (although by-product ammonia is obtainable at various points less remote), and for its potash again to the seaboard of the East and South for the foreign product or to California or New Mexico for the domestic. In each case long hauls are entailed. To what extent does this added cost defeat the aim of more general fertilizer use in this region and how may it be reduced?

The reduction in transportation costs, it is obvious, follows the development of close-by sources as contrasted with remote sources of fertilizer supply. The length of haul, if measured in dollars instead of miles, it is less obvious, is further reduced by increase in concentration, for while freight charges are based on weights, fertilizers are paid for on the basis of analysis. The farmer pays for plant food. He is not interested in carriers, so long as they are noninjurious. Doubling the plant-food content halves the freight charge, and in effect, in terms of dollars, halves the distance over which the product is transported. It may be said that of two fertilizer plants, one selling a 20 per cent plant-food mixture and the other a 40 per cent, other things being equal, the one selling the more concentrated product will be only half as far from the farmer buying this product, wherever located, as the other. And by the same token, the farmer buying the less concentrated mixture places himself at a correspondingly greater distance from his source of supply.

Increasing plant-food concentration, therefore, brings the Middle West farmer closer to the fertilizer resources of the Nation, both in the Southeast and in the Rocky Mountain region. While the phosphate deposits of the Southeast have supplied the requirements of the United States and, until the development of the African deposits, those of Europe as well, and while they have been regarded as being so great that their exhaustion has been of no concern, they are quite limited in extent as compared with the western deposits. Surveys have revealed only 326,000,000 tons in the eastern deposits as compared with 5,000,000,000 tons in Wyoming, Montana, and Idaho.

The adaptation of the blast furnace to phosphate reduction as it is being demonstrated by the Bureau of Chemistry and Soils yields phosphorus which is by all odds the most concentrated form for shipping purposes which can be devised. One ton of phosphorus represents the plant-food content of 14 tons of 16 per cent superphosphate. At the same freight rate, a ton of phosphorus located 1,400 miles from the consumer would be as close as a ton of superphosphate located only 100 miles distant, although conversion into a usable agricultural phosphate at some near-by point is still involved.

### Potash Deposits of Wyoming

In Wyoming, likewise, are the Nation's richest deposits of potash silicates, containing 200,000,000 tons of  $K_2O$ , which recent research indicates can be recovered concurrently with phosphorus to yield potassium phosphate of 86 per cent plant-food concentration. Close-by deposits of cheap coal promise low production costs and further offer the opportunity for ammonia synthesis.

Less remote are the potash deposits of Nebraska from which the Nation derived its chief supply of that agricultural necessity during the war years of potash famine. To what extent they can be brought back into production remains for research to determine. Undeveloped Texas deposits and deposits now under development in New Mexico provide additional supplies.

The future fertilizer requirements of the Middle West, therefore, seem assured. High concentration will reduce distribution costs so that these products can be delivered at costs comparable with those now prevailing in more favored regions.

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### FERTILIZER COMBINING SUPERPHOSPHATE WITH FREE AMMONIA SUCCEEDS

The first mixed fertilizers used in this country were prepared by mixing Peruvian guano or other nitrogenous material with superphosphate. To distinguish a mixture of this kind from a straight superphosphate it was commonly referred to as an ammoniated superphosphate. Within the last few years this same term has been applied to a mixture of a somewhat different character prepared by treating superphosphate with free ammonia.

The treatment of superphosphate with a basic material such as ground limestone, calcium cyanamide, etc., for the purpose of improving its mechanical condition, is a practice of long standing in the fertilizer industry. The possibility of using free ammonia in the treatment of superphosphate has also been recognized for some time, but its application for this purpose was not adopted until recently, owing to the relatively high cost of the ammonia.

The use of superphosphate as an absorbent for free ammonia was first applied commercially in the recovery of ammonia from illuminating gas. The ammoniated product obtained in this way was recommended for use as a fertilizer directly or after treatment with sulphuric acid to render the reverted phosphoric acid again soluble. This process, however, as well as others that have been proposed for a similar purpose, has so far failed to come into general use owing to the action of the superphosphate in absorbing toxic constituents of the coal gas in addition to ammonia.

### Recently Developed Processes

In a series of processes described by more recent investigators the conditions of the ammoniation treatment are more or less reversed. In the original processes the superphosphate was necessarily shipped to the source of the ammonia and it served the double purpose of re-

covering ammonia and supplying phosphoric acid for fertilizer use. In the later processes the ammonia is shipped in solution or as anhydrous ammonia to the source of production of the superphosphate, where it in its turn serves the double purpose of supplying nitrogen and acting as a conditioner for the superphosphate. With the commercial development of the synthetic process, free ammonia has become the cheapest form of combined nitrogen and its direct addition to superphosphate or superphosphate mixtures constitutes the most economical way of incorporating nitrogen in a mixed fertilizer. The consumption of free ammonia in fertilizer mixtures increased from about 5,000 tons in 1928 to 40,000 tons in 1930, and is likely to increase still further in the future. Its utilization in this way is one of the most interesting and important of the recent developments in the fertilizer industry.

The ammoniation of superphosphate or superphosphate mixtures is a comparatively simple operation and consists in adding a measured quantity of anhydrous ammonia or a solution of ammonia to a weighed quantity of the material or mixture in rotating drums or standard fertilizer mixers. The treatment of the superphosphate or mixtures containing superphosphate is usually carried out in batches of one-half ton to 1 ton each.

The rate of absorption of ammonia by a superphosphate containing the usual percentage of moisture is very rapid and is complete within one or two minutes, but the rate decreases with decrease in the water content of the superphosphate. The rate at which a superphosphate reacts with ammonia also decreases as its ammonia content approaches the maximum that it is capable of absorbing.

The ammonia is shipped in steel tank cars containing 50,000 pounds of liquid anhydrous ammonia. At the fertilizer plant the ammonia is either used directly as anhydrous ammonia, or it is absorbed in water to form a solution of ammonia of 25 to 30 per cent concentration.

The risk attending the storage of aqua ammonia is less than that of storing the anhydrous material. The use of the latter, however, has certain advantages over the use of aqua ammonia. It gives a drier product which shows less tendency to stick to the mixing apparatus and other equipment in which the treated material is handled around the plant. The quantity of ammonia in the form of a 25 to 30 per cent solution that can be added to the average superphosphate is limited to a maximum of about 2 to 2.5 per cent. Further additions give a mixture that is too wet and sticky. Anhydrous ammonia, however, produces dry mixtures of excellent mechanical condition up to the maximum that the superphosphate will absorb.

#### Limitation on Use of Free Ammonia

Both forms of ammonia, when added in excess of 2 per cent of the superphosphate present, bring about an apparent reduction in the availability of the phosphoric acid in the fertilizer as measured by the former official method for determining availability. The use of free ammonia was, therefore, limited to about one-fourth of the maximum that it is possible to include in a fertilizer mixture.

The apparent loss of availability that the superphosphate undergoes when ammoniated is due to a reaction between the ammonia and the components of the superphosphate to form a phosphate that is more or less insoluble as determined by the former methods of test-

ing. The authors of this article made a study of the composition and properties of the products formed in this reaction, and this study indicated that the availability of these products to plants should be greater than the official method then in use for measuring phosphoric acid availability would indicate. This was confirmed by the results of pot tests carried out by 20 State experiment stations with samples of the various forms of reverted phosphate occurring in ammoniated superphosphate.

The results obtained in this collaborative study showed that it should be possible at least to double the quantity of free ammonia used in fertilizer mixtures without appreciably decreasing the fertilizing value of the phosphoric acid in the mixture. Steps were accordingly taken by the official organization of the State control chemists which permitted an increase of about 100 per cent in the use of free ammonia in fertilizer mixtures. This will provide for an increase in the annual use of synthetic ammonia in this country of at least 80,000 tons having a wholesale value of about \$8,000,000.

#### Aids Drillability of Fertilizer Mixture

When ammonia is added to a fertilizer mixture containing superphosphate a marked increase in temperature occurs almost instantly, owing to the heat developed in the reaction. The ammoniation of superphosphate is thus of further interest in fertilizer manufacture in that this heat may be utilized in driving off excess moisture or may be applied as an aid in the granulation of the product, whereby its drillability may be greatly improved.

The direct use of free ammonia thus offers the advantages that (1) it brings about a marked reduction in the cost of fertilizer nitrogen; (2) it greatly improves the mechanical condition of the mixture; (3) it prevents rotting of the bags by neutralizing free acid in the fertilizer; and (4) it affords a means for reducing freight and handling charges by increasing the concentration of the fertilizer.

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#### POTASH EXTRACTION FROM UNITED STATES DEPOSITS STUDIED IN PROMISING EXPERIMENTS

Nearly every mineral found on the earth's surface contains some potash. The average rock contains about 3 per cent. Rocks containing as high as 5 and 6 per cent are not uncommon, although materials containing more than 10 per cent potash are extremely rare. A chemical process can not turn out a product containing anything not contained in the raw materials used. The possibility of developing a potash industry in the United States is dependent upon whatever deposits of potash minerals can be found in this country. Two promising deposits known are the greensand deposits of New Jersey and the leucite deposits of Wyoming. The potash content of the New Jersey deposits runs 5, 6, and 7 per cent; these deposits are tremendous in size, occur near the surface, are cheaply mined, and are relatively near the fertilizer market. The Wyoming deposits are not so extensive, although they are enormous; they are not quite so easily mined, and are farther from the present fertilizer market, but contain 10 and 11 per

cent potash. In its experiments and attempts to develop a process for producing potash, the Bureau of Chemistry and Soils is concentrating its major effort on these two minerals as raw materials for the possible process.

#### Extracting Potash from Rocks

Rocks are rather difficult things for the chemical engineer to break up into their constituents. This does not mean that satisfactory chemical means are lacking, but merely that most of these means are too expensive, so that the cost of extracting the product is more than the product is worth. The bureau is attempting to subject these potash minerals to furnace treatment at high temperatures. Carload lots of the Wyoming rock and the New Jersey sand have been shipped to the bureau's laboratory and treated in a number of experimental furnaces. The minerals are heated to the melting temperature and as they melt the potash comes out of the furnace as a fume. This fume may be removed from the furnace gases by an electrical device known as the Cottrell precipitator. This process can be easily operated and by it more than 90 per cent of the potash in the rock should be readily recovered.

#### Potash from Wyoming Rock

The characteristics of the Wyoming rock and particularly its relatively high potash content make it somewhat more easily adaptable to furnace treatment, so that the bureau's experiments indicate that a commercial furnace in Wyoming treating this rock may ultimately be able to produce a potash fertilizer material in competition with potash from other sources.

#### Potash from New Jersey Greensand

The New Jersey greensand with its lower potash content and with the larger amount of impurities which the furnace must melt, and still more important the higher cost of fuel in New Jersey as compared with that in Wyoming, have made it more difficult for the bureau to develop a process that would produce New Jersey potash at a cost as low as the price of imported material. Developments in the greensand process are going forward very satisfactorily and it is not possible to predict whether the commercial utilization of the Wyoming potash deposits or of the New Jersey greensands will be the first undertaken by industry. The utilization of these and other of the country's natural resources should result in a potash industry comparable with the country's needs for fertilizers.

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### FERTILIZER PLACEMENT OF VAST IMPORTANCE IN COTTON-GROWING STATES

The difficulty sometimes experienced in securing a full stand of cotton, which is important in producing large acreage yields, may be caused by the use of poor seed, by environmental and climatic conditions, or frequently by the incorrect application of fertilizers. To obtain maximum results from commercial fertilizers in growing cotton, the method of applying the fertilizer, the time of application, and the placement of the fertilizer in relation to the position of the seed are important.

A common practice is to apply the fertilizer in an open furrow, mix and cover it with several inches of soil a week or 10 days prior to planting the seed. This procedure has possibly been considered the best practice for many years but it has now become desirable to apply the fertilizer and plant the seed in a single operation, thus saving labor and expense. In each procedure the fertilizers may be placed too near the seed or in contact with it, frequently resulting in injury to germination and broken stands. However, less injury to cottonseed probably has occurred when the fertilizer is applied before the seed is planted, because under favorable soil-moisture conditions the readily soluble fertilizer salts will be dissolved in the soil moisture, and distributed and absorbed over a wider soil area, resulting in less concentration of fertilizers in the soil within the root zone of the young plants.

The necessity for precaution is greater in applying the newer fertilizers containing larger quantities and higher concentrations of readily soluble salts than in applying fertilizers manufactured before the war and containing relatively small quantities of quickly soluble salts and large quantities of slowly soluble nitrogen materials of vegetable and animal origin. The results of four years of experiments with cotton in Virginia, North Carolina, South Carolina, and Georgia show that fertilizers containing readily soluble salts applied under the seed or in contact with the seed simultaneously with planting caused less injury on heavy clay soils than on light sandy soils, and when fertilizers were applied to the side of the seed or under the seed two weeks before planting there was no injury to germination or to young plants. The amount of water-soluble salts in the soil within the root zone of the young plants three weeks after fertilizer application was greater where fertilizers were applied under the seed or in contact with the seed than where they were applied to the side of the seed. The degree of seed injury from fertilizers may vary with moisture conditions in the soil. In these experiments, in seasons of heavy rainfall, there was a smaller concentration of soluble salts in the surface soil and less injury to seed and young plants.

In using commercial fertilizers in growing cotton, precautions should be taken to apply them so as to avoid injury to seed and to young plants, yet they should be placed sufficiently near the seed to become available during the early period of growth. A supply of readily available plant food is essential in forcing the growth of cotton in the spring to achieve early blooming, fruiting, and maturing.

### Experiments in South Carolina

Extensive experiments in efficient fertilizer distribution and placement with cotton have been made by the Department of Agriculture, cooperating with the South Carolina Agricultural Experiment Station and a joint committee representing farm-machinery and fertilizer manufacturers. A number of fertilizer-distributing machines used for cotton work were found to have cycles of delivery and distributed the fertilizer very ununiformly, resulting in an ununiform stand and growth of cotton. The more irregular the distribution of fertilizer the lower the yields. Some machines apply the fertilizers ineffectively in some cases so near the seed as to cause injury to germination or too far away from the seed to be most effective. In other experiments fertilizers were applied in more than 20 different locations with respect to the cottonseed. The results vary with the character of the soil

and with moisture conditions. On a sandy clay loam soil the placement of fertilizer did not interfere with stands of cotton except where the fertilizer was in contact with the seed. On fine sandy loams and coarse sands fertilizers applied at a depth of 3 inches or less below the seed caused considerable injury to germination, being more severe at the shallower depths and extremely severe when the fertilizer was in contact with the seed. With fertilizer placed at the side of the seed there were normal germination and good stands.

The increase in rate of a concentrated fertilizer above 200 pounds per acre was attended by injury to the stand when the fertilizer was



FIGURE 205—Effect on stand of cotton of a fertilizer analyzing 8 per cent nitrogen 16 per cent phosphoric acid, and 8 per cent potash, applied as follows. A—Mixed with the soil below the seed, *a*, 600 pounds, *b*, 400 pounds, *c*, 200 pounds per acre. B—In bands 2 1/2 inches to each side of and 2 inches below level of seed *a*, 600 pounds *b*, 400 pounds *c*, 200 pounds per acre

applied below the seed, although no effect upon the stand was noticed where the fertilizer was applied to the side of the seed. In Figure 205 the stand of cotton resulting from applying a high-analysis fertilizer under the seed and to the side of the seed is shown. This cotton was planted April 22 and photographed May 17. The characteristics and distribution of mature plants resulting from the placement of the fertilizer are shown in Figure 206. In plots where the seed germination was retarded, early growth checked, or a broken stand prevailed small yields of cotton were produced.

If fertilizer is to be applied below the seed, as is the common practice, it may be found advantageous in using concentrated fertilizer or large amounts of ordinary analysis fertilizer, to apply a portion of the mixed fertilizer at planting time and the remainder as a side dress-

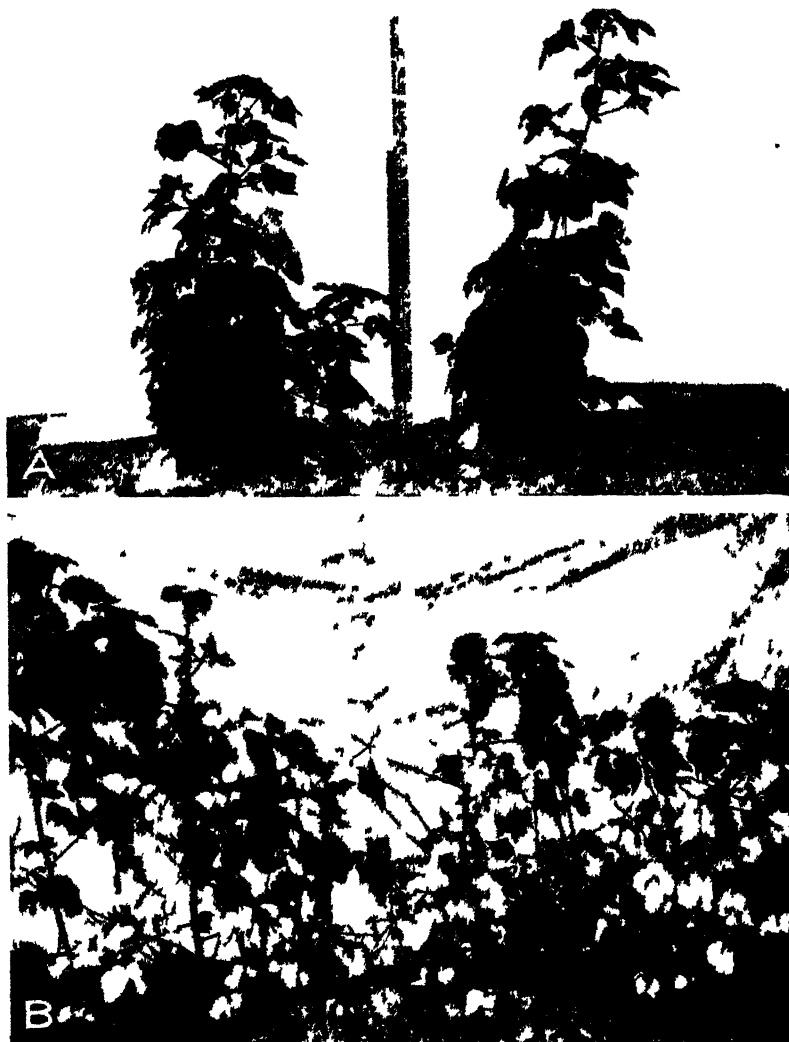


FIGURE 206 —Characteristics and distribution of mature cotton plants on a fine sandy loam fertilized with 800 pounds per acre of a fertilizer containing 4 per cent nitrogen, 8 per cent phosphoric acid, and 4 per cent potash applied as follows A, in contact with seed, B, in bands 2 1/2 inches to each side of and 2 inches below the level of the seed

ing after chopping the cotton. The greatest efficiency may be obtained from fertilizers when they are placed closest to the seed provided injury to germination is not serious

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## FERTILIZER EXPERIMENTS SHOW PHOSPHATE IS CHIEF NEED IN THE MIDDLE WEST

There is an interesting fertilizer story about the Great Plains country and the intermountain region of the United States. It refers to the phosphate requirements of many of the soils in these regions for successfully growing sugar beets, grains, alfalfa, and other products. Use of fertilizers is comparatively new in these lands, but the tonnage consumed is increasing rapidly and a fruitful field is being opened up for the extension of the use of fertilizer, especially phosphates, at the present time. Back of this development lie years of research and trial, sometimes discouraging, but ultimately pointing clearly the way to increased yields per acre and a more profitable agriculture.

The need for a systematic study of the fertilizer requirements of these Middle West soils was brought to the attention of the Department of Agriculture early in 1921 by representatives of the beet-sugar industry, who emphasized in particular the necessity of such studies in the Arkansas River Valley of Colorado. A preliminary investigation showed that both yield and sugar content had shown a gradual decline since beet culture was begun in the valley; it was asserted that measures must be taken to make the growing of sugar beets more profitable to the growers and to the factories, since two factories were already idle; that fertilizer experiments in the past had shown no results; that nitrate was present at times and in certain places in prohibitive amounts. The officials and research staffs of some of the big companies operating in Colorado and now pushing a vigorous fertilizer program stated that fertilizers had been tried and found ineffective in these fertile western soils and that their influence on beet production was negligible.

There was then no fertilizer worthy the name sold in these regions. Growers were advised by some persons familiar with these conditions to let well enough alone, that the main difficulties were beyond the scope of soil-fertility investigations and remedial fertilizing measures. The department began some preliminary work in May, 1921, at Rocky Ford, Colo.

### Triangle Experiments With Fertilizer

Since the nitrate content in these Arkansas Valley soils had been shown by the Colorado experiment station to be high, it was thought that a balance might be struck by applying the proper quantities of potash or phosphate, or both. With this view and to test the principle of balanced plant food, the now well-known triangle experiments were started. In these, all possible combinations of the three plant foods, nitrogen, phosphoric acid, and potash, were applied singly, in combinations of two, and in combinations of all three, in different proportions or ratios, to a total of 21 different combinations. By this means it is possible to determine readily a definite indication of which plant food is the most deficient in the soil, or the most effective in the fertilizer combinations, and to obtain some indications of the best and most profitable analysis. Several years' results are necessary, of course, to a final answer to the question, but even the first year's evidence was promising in showing that the fertilizers high in phosphoric acid seemed to be most effective. That year the flood which did such tremendous damage at Pueblo swept down the Arkansas Valley and overflowed the experimental plots to a depth of 5 or 6

feet, so mutilating them that it was necessary to abandon the project without obtaining any definite records of value.

The experimental work was resumed in 1922 at four different localities, at Rocky Ford, at Las Animas, at Wiley, and at Lamar. All these experiments indicated that fertilizers high in phosphoric acid gave good responses, although the lighter soils studied showed that a complete mixture was indicated for best results.

In the experiments at Lamar the yield from phosphoric acid alone was 15.2 tons of beets and 4,120 pounds of sugar per acre. Nitrogen alone produced 12 tons of beets and 2,897 pounds of sugar and where potash only was used, 10.6 tons of beets and 2,643 pounds of sugar per acre were obtained.

Where phosphoric acid, nitrogen, and potash were used in combination as a complete fertilizer, the yield of beets was no greater than with phosphoric acid alone, but 295 pounds more of sugar per acre were obtained. The average of the unfertilized plots was only 10.4 tons of beets and 2,738 pounds of sugar to the acre.

#### Conclusive Results at Grand Island, Nebr.

The first experiment at Grand Island, Nebr., in 1925, was located in a field leased by a sugar company for experimental purposes as being representative of the average farming land of that section. The returns for phosphate fertilizers were perhaps as conclusive as any results yet obtained. The unfertilized plots yielded 4.9 tons of beets per acre and only 1,361 pounds of sugar. The phosphoric acid alone produced 15.2 tons of beets and 5,253 pounds of sugar. Phosphoric acid with a little potash or nitrogen added gave 16.8 tons of beets and an even higher proportion of sugar. Eighty pounds of phosphoric acid, or 500 pounds of 16 per cent superphosphate per acre, were used in these experiments. Later experiments showed that the same amount could have been distributed over 2 acres instead of 1 without any material diminution of yield, so that about 30 tons of beets might have been obtained from 2 acres with the same amount of fertilizer. (Fig. 207.)

The experiments continued in following years in Colorado, Nebraska, Iowa, Minnesota, and North Dakota, have shown conclusively that this response to fertilizers high in phosphoric acid, and to superphosphate alone, is fairly characteristic of the soil regions in which sugar beets are grown.

The value of these experiments is accentuated by the low cost of the plant-food element most needed and the results to be obtained from an application of fertilizer as small as 125 to 200 pounds per acre of a 16 to 20 per cent superphosphate. Where the treble superphosphate is applied, not more than 100 pounds per acre is generally necessary. The cost of the fertilizer to the grower is from \$2 to \$3 per acre. With an average increase of 3 tons per acre at \$6 per ton the additional profit is about \$15 per acre—as much as the total value of a good wheat crop.

In 1922, when the soil-fertility work with sugar beets was started, no fertilizer was used commercially on sugar beets in Colorado, the largest and most profitable sugar-beet territory in the country. The beet-sugar companies adopted a fertilizer program based upon the results of the experiments conducted by the department in the Arkansas Valley. They started with a carload but the practice more than doubled with each successive year's results and recommendations. One of the com-

panies, observing in 1928 that the superphosphate-treated fields held the beet disease, known as blackheart, under control, has to-day an extensive phosphate program under way

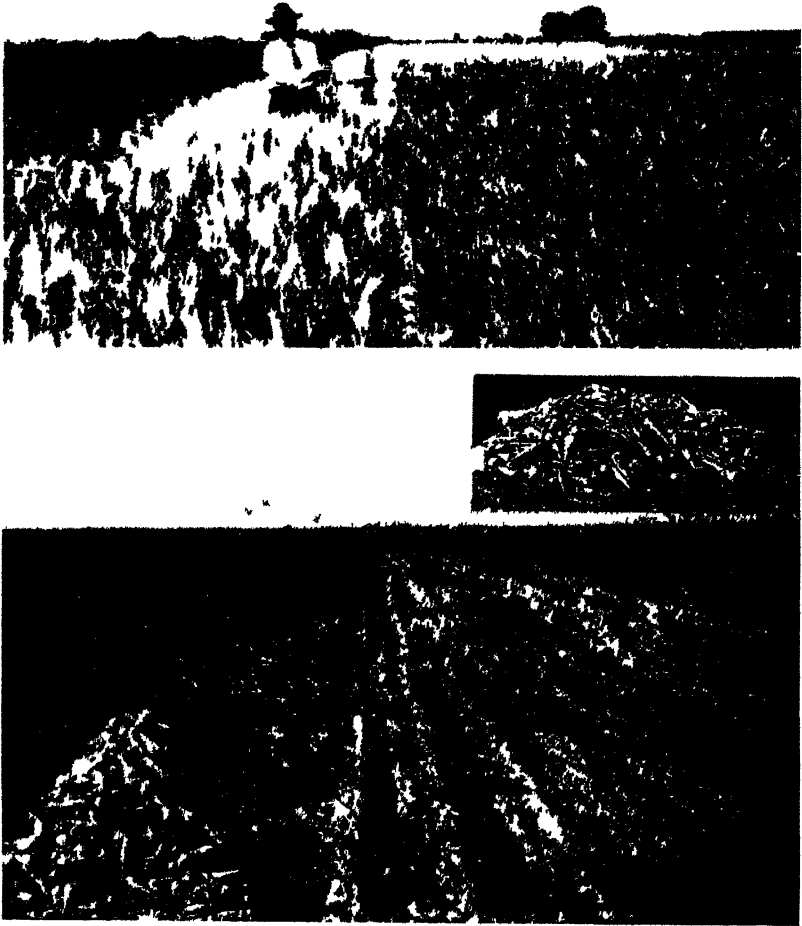


FIGURE 207.—Effect of superphosphate on grain and sugar beets on Middle West soils. On left, 150 pounds of superphosphate per acre, on right, no superphosphate

#### Superphosphate Distributed By Sugar Companies

When the soil-fertility studies were begun in 1925 in Nebraska no commercial fertilizer was being used on sugar beets. So striking were the results of the experiments by the department that in 1927, five carloads of superphosphate were distributed by one of the beet-sugar companies in its Nebraska territory. Other sugar companies also distributed it to their growers to mutual profit.

Inspired by the good results obtained in Nebraska, requests came for the extension of the soil-fertility studies to include Iowa, Minnesota, and North Dakota, which was done in 1926, when two complete tri-

angle experiments were started in Iowa, three in Minnesota, and one in North Dakota. (Fig. 208)

Growing sugar beets in the Red River Valley of North Dakota and Minnesota was a new project and doubt was expressed as to whether they would need fertilization in such supposedly rich soils. Continued experiments, however, showed most convincingly that proper fertilization of sugar beets, even upon the rich Red River Valley lands, will pay. On account of the results obtained through the department's cooperative work with the sugar companies, several carloads of fertilizer were distributed by the sugar companies in that territory. In the sugar-beet region of northern Iowa the use of fertilizer is now made a part of the contract between growers and the beet-sugar company.

### Steady Increase in Fertilizer Tonnage

From a single carload of fertilizer in Colorado in 1923, following the department's experimental demonstration of profitable results, the tonnage of fertilizer used has grown steadily throughout the sugar-beet territory as the result of this work of the United States Department of Agriculture, of the State experiment stations, of beet-sugar companies, and of fertilizer companies, and to-day the fertilizer consumed in the sugar-beet territory has reached a considerable amount. In one district every acre in beets in 1931 was fertilized with phosphate. No definite information is available at this time on the acreage of sugar beets that is fertilized this season, but it is estimated at 200,000 to 300,000 acres. With an average increase of 3 tons of beets per acre, at \$6 per ton, the value of the 1931 crop was increased by about \$5,000,000, at a cost for fertilizer approximating \$700,000. The increased value in grain and other crops can not now be estimated, but the extended use of fertilizers for this purpose in Nebraska and adjoining States is very large.

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### TOBACCO IN SOME SOILS MAY REQUIRE SECONDARY ELEMENTS IN FERTILIZER

A complete fertilizer has been considered to be one containing the three essential elements—nitrogen, phosphorus, and potassium. Owing, however, to the complex materials previously used in their manufacture, the so-called complete fertilizers have contained considerable quantities of essential elements other than the three mentioned above.

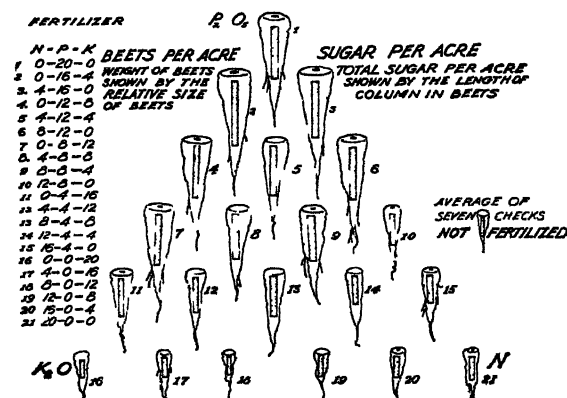


FIGURE 208—Relative yields of beets and sugar obtained with different fertilizer combinations in Middle Western States, showing the phosphate response in these soils

However, there is at the present time a tendency toward the use of relatively pure chemicals to supply the three constituents heretofore regarded as constituting a complete fertilizer.

#### Elements Necessary for Growth

More than one-half of the tobacco crop of the United States is grown on sandy and sandy loam soils. These soils are relatively low in natural plant food and in this respect may approach the pure sand culture as used by the physiologist in his studies on the mineral nutrition of the plant. Recent investigations have shown that at least 10 elements need to be taken into account in any consideration of the mineral nutrition of the plant, namely, nitrogen, phosphorus, potassium, magnesium, calcium, sulphur, chlorine, iron, manganese, and boron. These elements are present in various quantities in tobacco soils, and their relative abundance determines what constitutes a complete fertilizer under a given set of conditions. Heretofore in general fertilizer practice only three of the above-mentioned elements—nitrogen, phosphorus, and potassium—which may be called the pri-

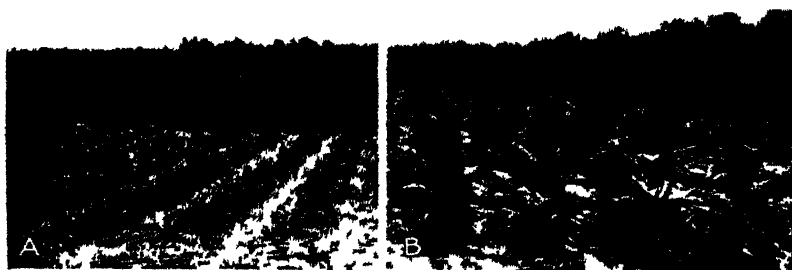


FIGURE 209—A, Tobacco grown with a fertilizer mixture which did not supply calcium and magnesium; B, tobacco grown on a near-by plot which was fertilized with a mixture furnishing calcium and magnesium

mary elements, have been given any serious consideration. When pure chemicals which supply only these three elements were used on some of the sandy and sandy loam tobacco soils very unsatisfactory growth was obtained. However, when the secondary elements, magnesium, calcium, sulphur, and chlorine, were supplied, growth was normal.

#### Elements Deficient Under Field Conditions

Recent studies with the tobacco crop have indicated that magnesium and calcium are likely to be deficient when only nitrogen, phosphorus, potassium, sulphur, and chlorine are supplied. (Fig. 209.) The supply of sulphur sometimes appears to be insufficient during the early growth of the tobacco plant, this insufficiency slowing down the growth rate. However, as the season advances, either the soil supply gradually becomes available, or the rainfall seems to bring down sufficient sulphur, or the two factors combine to furnish enough of this element for the needs of the tobacco plant. Chlorine is another element that produces a decided effect on the growth of the tobacco plant. It is readily absorbed by the plant, and in conditions of comparative drought it may serve to prevent the so-called drought spot on

the leaves of the plant. This protective action from drought injury is not specific for chlorine, but also seems to be obtained from the element nitrogen when that is liberally supplied in the nitrate, ammonia, or organic form. This is particularly fortunate, because the use of chlorine may produce a leaf of low fire-holding capacity which is so undesirable in the cigar types, since these are grown with an abundant nitrogen supply. If large quantities of chlorine are absorbed by the plant when the soil moisture is adequate, the water content of the tissues may be raised to a point where the carbohydrate metabolism of the plant is so upset as to produce retarded growth. When chlorine is used in excess the cured leaf is of poor quality.

A shortage of manganese and iron so far have not been reported as occurring under field conditions with tobacco. Soils of neutral or alkaline reaction have been found in some instances to supply an amount of these elements insufficient for normal growth of other crops, but, in view of the fact that tobacco does not succeed well under these conditions, owing to disease, these elements have not been found to be practically important as fertilizer ingredients for this crop. The necessity for boron under field conditions has not been observed in this country, but a shortage of this element has been reported as producing a typical malnutritional disease in Sumatra. From a practical standpoint none of the other elements, such as copper or zinc, which have been reported by some investigators as essential to normal growth, has been shown to be of any importance in tobacco fertilizer practice.

#### Quantities of Secondary Elements Needed

The constitution of a complete fertilizer for tobacco depends somewhat upon the type of leaf to be grown. Special attention must always be given to effects on the quality of the cured leaf. The quantities, ratios, and sources of the three primary elements of commercial fertilizers have been fairly well worked out for the different types of leaf produced in this country, but it has only recently been recognized that fairly definite quantities of the secondary elements must also be supplied on some of the light soils used in growing this crop.

Information available at present seems to indicate that magnesium and chlorine should be supplied at the rates of 20 to 25 pounds per acre in soluble compounds. The quantity of calcium and sulphur should be 50 pounds or more per acre. Magnesium, sulphur, and chlorine should not be supplied in amounts greatly in excess of the quantities indicated, because they are injurious when used in excess. For those types of tobacco to which abundant nitrogen is supplied in the fertilizer mixture, chlorine should be omitted. The above quantities of the three or four elements, as the case may be, can be obtained by using appropriate amounts of standard fertilizer materials. Superphosphate may be relied upon to furnish the necessary calcium and sulphur in addition to the phosphorus. The magnesia may be obtained from oil-cake residues, sulphate of potash-magnesia, or dolomitic limestone. The chlorine, if necessary, can be supplied in the form of muriate of potash.

#### Tobacco Plant Shows Distinct Deficiency Symptoms

By observing the tobacco plant it is often possible to determine the element needed to constitute a complete fertilizer. It is characteristic

of this plant to develop distinctive pathological symptoms when any one of the essential plant nutrients is lacking in the soil, if the fertilizer mixture does not supply the element in question.

A deficiency of nitrogen is shown by the whole plant assuming a light-green color, with more or less yellowing and drying up or "firing" of the lower leaves to a light-brown color. A shortage of phosphorus, on the contrary, produces a plant that is abnormally dark green in color. A shortage of potassium and magnesium, in contrast with nitrogen and phosphorus deficiency, results in localized effects, with chlorosis of the lower leaves as the dominant characteristic. Typical potassium hunger is distinguished from magnesium hunger by the appearance of small necrotic spots or specks at the tips and margins of the chlorotic leaves. The chlorotic areas in the case of potassium hunger are yellowish, while when magnesium is lacking they are light green or white, with the principal veins tending to retain the green color in both cases. Under potassium deficiency the leaves turn or roll under at the tips and margins and in the case of magnesium hunger appear to cup up.

In contrast with the deficiency effects of the above elements are those typically occurring on the new growth or bud leaves and caused by deficiency in iron, manganese, sulphur, boron, or calcium. Of this group only calcium deficiency has been observed on tobacco under field conditions in this country. A shortage of calcium first becomes apparent as a peculiar hooking downward of the tips of the young leaves composing the bud, followed by a breaking down of these leaves at the tips and margins. If later growth takes place, the tips and margins show a cut-out appearance. In extreme cases of calcium shortage the terminal bud dies.

J. E. McMURTREY, Jr., *Bureau of Plant Industry.*

# LIVING STANDARDS ON THE FARM

## FAMILY LIVING STANDARDS DEPEND ON USE AS WELL AS ON SIZE OF INCOME

"The farmer's standard of living," is frequently spoken of as if all of the 6,000,000 farm families in this country enjoy the same living conditions. Actually, of course, farm-family living ranges from the very meager subsistence which is typical of certain unfavored sections, to the abundant and varied living available to some families in very fertile areas. And in every part of the country there are many families whose living conditions for one reason or another leave much to be desired, even in years of general prosperity. Any methods of improving these conditions which are within the reach of the family are worth consideration.

The level of family living on the farm depends upon several different factors—the size of the family's cash income, the efficiency with which it is spent, the food and fuel furnished by the farm for family use, the kind of house which the farm affords, the furniture and equipment secured in past years, the hours of labor on the farm and in the home, and the skill with which the homemaker uses the various materials available.

Cash expenditures are the usual measure of the standard of living of city families, who must purchase all of their food and fuel and, in most cases, pay rent. Most farm families, of course, raise a large part of their food supply, procure their fuel from the farm wood lot, and have the use of the house without money payment. Nevertheless the amount of money which a farm family has to spend is of very great importance in determining what its living will be.

In the rugged valleys on the western slopes of the southern Appalachian Ranges live many American farm families whose environment is frequently as difficult as it is beautiful. The slopes of the valleys are very steep, the soil is shallow and the valley floors are narrow. In many of the communities in this area making even a meager living takes long hours of work, great patience, and skill in overcoming geographic difficulties. The average money expenditure of 227 families in Knott County, Ky., a district typical of many parts of the Appalachian Highlands, was \$450 in 1929. In spite of the fact that these families raised about two-thirds of their food supply, more than one-third of their cash expenditures went to buy food. Another third was spent for clothing, and the remaining small sum was used in buying the other things needed.

### Varying Division of Incomes

The money incomes of these mountain families are of course lower than those of most farm families in the United States in normal years. When the family's cash expenditures are as high as \$900, the division of the total is naturally quite different from that which is usual at the lower income levels. A study of 2,886 farm families in 11 States whose expenditures averaged \$913 showed that only 24 per cent of the total was spent, on the average, for food, and 26 per cent for clothing, while half was left for household-operating expenses, the maintenance of health, education, recreation, savings, and other items that go to make up what we think of as typical American family living.

The highest average money expenditures shown in any recent study of farm-family living were made by a group of 40 families in Maryland, Vermont, Illinois, and Ohio, whose household accounts were analyzed by the Bureau of Home Economics. These families spent on the average \$1,684, allotting only 19 per cent to food and 14 per cent to clothing, and having a full two-thirds of the total left for other items.

Whether the cash expenditures are large or small, it is clear that improving the use of the farm family's money income is one important means of improving family living. Even the wisest management will not, of course, convert an inadequate income into an adequate one. But by careful planning the homemaker can make the available income go as far as possible. She can see that all the needs of every member of the household are taken into consideration before the money is spent. And she can make sure that no important purchases are made until information has been secured on whether the goods about to be purchased are durable and well constructed and suited to the needs of the family.

Another means of stretching the family's cash income is by producing at home as much of the family's living as possible. In the Kentucky mountain group referred to above, a considerable proportion of the goods which the family consumed was produced at home. One-half of these families were doing their own shoe repairing, two-thirds were making quilts, three-fourths were making soap, and one-fifth were making brooms. A few were still using the spinning wheel, a few were weaving fine woolen blankets and coverlets, and a few were making furniture. Churning, canning, pickling, drying fruits and vegetables, and butchering were being carried on in every home. Many of these activities are not feasible, of course, in every farm household, but they are suggestive of the ways in which the cash income can be supplemented by the time and skill of the housewife and other members of the family.

### Food Furnished by the Farm

The food which the family raises for its own use is perhaps the most important addition which can be made to the family income. Most farm families, of course, produce some of their own food supply, but frequently not enough to provide a completely satisfactory diet all the year round. In the Kentucky mountain group, the average money value of the food raised at home, and of the game and wild berries and cresses with which the families supplemented their diet,

was \$430 a year, almost as much as the total amount of their money expenditures. For the 2,886 families with annual cash expenditures of \$913, the average value of food furnished by the farm was \$440, about the same as that for the lower-income group. For the group of 40 families with the highest money expenditure, the value of home-produced food was also highest, amounting to \$540 a year. It is of crucial importance that food production in the garden and other parts of the farm should be carefully planned in relation to the dietary needs of the family, so that an adequate food supply may be provided in the most economical way.

The differences in housing standards between one rural section and another are greater than the differences in the money value of food consumed. The average value of the houses studied in the Appalachian county mentioned above was \$340, while that of the homes occupied by 2,886 families in 11 States was almost \$2,000, and the account-keeping families cooperating with the Bureau of Home Economics occupied homes valued at an average of almost \$5,000.

In considering the betterment of the family living, many farm homemakers will think first of the improvements they wish to make in the houses in which they live. While the changes they desire may be impossible in years when cash resources are especially low, some important alterations may be carried out by members of the family, using supplies from the farm itself. Provisions for adequate sanitation, for instance, cost very little money, but they are imperative to the health of the family.

When the money values of all the goods and services furnished to these families by their farms are added together, the averages are found to be \$546 for the Appalachian group, \$684 for the 2,886 families in 11 States, and \$876 for the 40 account-keeping families. These goods and services formed more than one-half the total value of family living for the first group; about two-fifths for the second group; and about one-third for the third group.

It is convenient to measure the total value of family living of any group of families by adding the average value of goods and services furnished by the farm to the average cash expenditures. Measured in this way, the total value of living of the three groups considered here amounts to \$996 for the first; \$1,598 for the second; and \$2,560 for the third.

These figures can not, however, be compared directly with the money expenditures of city families. There are many elements in both the urban and rural situations which can not be measured in terms of their money value to the individual family. The feeling of security which comes to the family whose home and food supply are certain, even though its cash income is very low, is not the least important factor in the rural situation. Sunlight, fresh air, and quiet, which the farm family takes as a matter of course, have an important health value, even if it has never been stated in terms of dollars and cents.

The improvement of farm-family living is largely dependent, of course, upon increase in cash income, but it is also true that important changes can be made by planning family expenditures more carefully and by utilizing the resources of the farm with increasing skill for bettering the conditions of family life.

FAITH M. WILLIAMS, *Bureau of Home Economics.*

## HOME ECONOMICS RESEARCH ASSISTS HOME MAKERS TO SPEND INCOME WISELY

The standard of living a family is able to maintain depends upon the money income of the family, its labor resources, and the ways in which both income and labor are used. Economical distribution of time and money makes possible a higher level of living when incomes are static. When the money income falls, the standard of living may be seriously threatened, if not drastically lowered. A shrinkage of the moderate income may mean only a lesser degree of comfort, but the shrinkage of low incomes may be a matter of health, morale, or even of life and death.

It is at such times, most of all, that the housewife needs knowledge of the foods the body requires and of the foods that furnish the best nutritive values for least money. She needs to know which foods, which household material or services can be substituted for each other, and she needs to know which the family can safely do without.

The broad function of the Bureau of Home Economics, which is to assist in maintaining and improving the standards of home life, was never more effectively served than during these last years of drought and unemployment. From every section of the country, from farm and city alike, appeals have come for information and advice which would enable the home maker to safeguard the health of her family in the present times of stress. County agents, home-demonstration agents, relief workers, and social-welfare organizations of many kinds have asked and received assistance in programs of community service. A food guide, in terms of low-cost foods exclusively, was issued for housewives and for relief workers, and this has been supplemented by a weekly press release designed to help the housewife to adapt the food guide to market conditions and to plan meals and recipes for food available within the minimum budget.

These are current emergency aspects of the practical service of the Bureau of Home Economics in maintaining standards of living. An increasing volume of mail, bringing evidence of appreciation and requests for further service of this kind, shows the timeliness of this work. Meantime, however, there has been no cessation in the long-range work of the bureau, one division of which has in view the better adjustment of large-scale production to consumer needs.

The direction of money expenditure, at all times vital in its effect on comfort and health, has come to be increasingly important since the home has ceased to be a self-sustaining unit and has become more and more dependent on goods produced outside. With the rapid development of modern industry, food, clothing, bedding, furnishings of all kinds—almost every article of household use and almost every kind of household service once produced in the home—are now produced commercially. The home, itself, so far as commodities are concerned, has become more important as a consumer than as a producer. The American home is in all probability the largest consumer's market in the world.

### Difficulty of Judging Values

The consumer, however, is confronted with a staggering array of goods from which to choose and is too often left without means of judging their quality or adaptability to home needs. The home maker has to meet the requirements of her family with expenditures limited by the cash income and the usable labor resources of the home.

American farms and factories are equipped and organized for large-scale production of goods which must be sold in quantity to justify production costs. Competition in sales has multiplied variety of products, has increased the selling costs, and has launched a system of high-powered salesmanship which results in still further confusion of values.

The effect of all this has been to change the emphasis in certain practical fields of education and in none more than in home economics. The greater the distance between the man who makes or grows goods for home use and those who use these goods, the greater the need for education of the consumer in wise choice of the purchased commodities and the more important a study of consumer needs as a guide to production markets.

Such studies are being made by the Bureau of Home Economics in several projects now under way. Data on home expenditures showing the distribution among food, clothing, housing, health, savings, luxuries, etc., are being collected to show consumption trends and standards of living. Budgets are being collected to show the lowest incomes that permit an adequate standard of living. The food supplies of different population groups in several sections of the country are being studied and checked against the nutritive needs of those groups.

Standards for expenditures based upon real needs, and expressed in terms of materials to be bought, would not only be a guide to wise consumption, but should form the foundation upon which to build a stable production program. Volume production requires a stable market to keep it going smoothly. Any interruption of production brings unemployment, decreased incomes, lessened buying power, and decreased demand. There must be a better fit between consumer demand and goods produced, to provide stable income to purchase those goods. A production program guided by home needs, with the fewest steps between producer and consumer, will safeguard standards of living.

Such a production program must be established on the basis of ascertained facts, and it is to supply such facts in terms of consumer needs as well as trends of actual consumption, that the Bureau of Home Economics investigations in this field are made. Because the same set of facts can be used to guide the producer in estimating consumer demands, these studies should have double importance in promoting better standards of living.

LOUISE STANLEY, *Bureau of Home Economics.*

## DIVIDING THE FOOD DOLLAR INTO FIVE PARTS HELPS TO SAFEGUARD LOW-COST DIET

For any family, careful planning is necessary to provide the best diet obtainable at every season of the year. This truth applies both to the city family which must purchase all of its food and to the rural family which produces part of its food and purchases the rest. It applies more emphatically to the family of small means anywhere, because the need of well-balanced meals becomes greater as the available food supply grows less.

The quantities of the different articles of food which are needed will differ from family to family, but the kinds of food required are the

same. All of the nutritional needs of a family of five, with two adults and three children, will be met by the foods listed below. This list of foods is adjusted to families whose income is small and who can produce but little food at home.

**SUGGESTED WEEKLY FOOD SUPPLY FOR FAMILY OF FIVE (TWO ADULTS AND THREE CHILDREN) WITH LOW INCOME**

Flour and cereals (1 pound flour counts as 1½ pounds bread.).	20 to 24 pounds.
Milk	18 to 28 quarts.
Potatoes or sweetpotatoes	12 to 15 pounds.
Dried beans, peas, or nuts	1 to 3 pounds.
Tomatoes or citrus fruits	6 pounds.
Leafy or other green or yellow vegetables	4 to 5 pounds.
Other vegetables and fruits	10 to 13 pounds.
Butter	1 pound.
Other fats (including salt pork and bacon)	2 to 3 pounds.
Sugar, molasses, jellies	3 to 5 pounds.
Lean meat, poultry, fish	5 to 7 pounds.
Eggs	8 to 12.
Coffee, tea, cocoa, salt, baking powder, etc., as needed.	

This food supply will furnish the food elements known to be necessary for health, normal growth, and development. The amounts of some of the foods, however, are not as generous as might be desired, and whenever possible, the larger quantities of milk, eggs, vegetables, and fruit should be used. These foods contain important substances not found in sufficient amounts in the other articles of the diet. The larger quantities of all other items will be needed if the adults are engaged in hard work, and if the children are very active and are growing rapidly.

### The Food Dollar of the City Family

The cost of this food supply will vary, at present retail prices, from about \$7.50 to \$10 a week. The exact cost will depend upon what varieties of food are chosen within each food group and the quality and form in which they are obtained, as well as upon the dealer and the services, such as delivery or credit, which may or may not be provided by the store at which the goods are bought.

When all the family's food is purchased, and at retail prices, expenditures for the various kinds of food will be balanced if the food dollar is spent approximately as shown in Figure 210. For a family with children this would mean:

- 25 cents for milk and cheese.
- 20 cents for vegetables and fruit.
- 20 cents for fats and sugars.
- 20 cents for breadstuffs, cereals, and legumes.
- 15 cents for other foods—eggs, lean meats, fish, and accessories, as salt, tea, coffee, and baking powder.

### Food Expenditures of Farm Families

In most localities the farm family does not purchase all of its food, but produces much of it. Many farm families produce all the milk, butter, eggs, poultry, and vegetables, most of the fruit, and a large part of the lard and lean meat which they need.

These home-grown products may amount to from one-half to four-fifths of the money value of the entire food supply. In a recent bureau study of 2,400 farm families, food purchases were found to be restricted mainly to manufactured foods, such as flour, prepared cereals, sugars, cheese, and such accessories as coffee, tea, salt, or spices. The cash

outlay for food was relatively small, and was apportioned very differently from that of the city family. Each food dollar of these farm families was spent approximately as follows:

	Cents
Vegetables and fruit.....	15
Fats and sweets.....	25
Bread, cereal, flour.....	35
Lean meats or fish.....	10
Accessories.....	15

To be sure, foods produced at home cost time and energy, and may add somewhat to farm expenses. But this extra effort or expense is abundantly repaid by the improvement in the family's diet which it makes possible. By planning carefully for raising and preserving food at home, farm families with low cash incomes can enjoy throughout the year the kind of food which only families of moderate or large income can afford when all of the food must be bought. Their diet can be better than the low-cost diet suggested above, since they can include a larger proportion of milk, butter, vegetables and fruits, eggs, and lean meat and poultry.

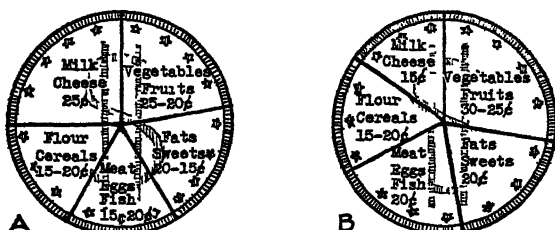


FIGURE 210.—Divide your food dollar into five parts: A, For a family with children, B, for a family without children

### Better Diet Possible at Less Cost on Farms

The following weekly food supply shows the amounts of the different foods needed to provide this better diet for a family of five, with two adults and three children. Such a diet is within the reach of farm families who produce a large share of their food at home and of city families with moderate incomes.

#### SUGGESTED WEEKLY FOOD SUPPLY FOR FAMILY OF FIVE (TWO ADULTS AND THREE CHILDREN) OF COMFORTABLE MEANS

Flour and cereals (1 pound flour counts as 1½ pounds bread)...	12	to 15 pounds.
Milk.....		28 quarts.
Potatoes or sweetpotatoes.....		10 pounds.
Dried beans, peas, and nuts.....	½	to 1 pound.
Tomatoes or citrus fruits.....	6	to 8 pounds.
Leafy or other green or yellow vegetables.....	6	to 8 pounds.
Other vegetables and fruits.....	15	to 25 pounds.
Butter.....		2 pounds.
Other fats (including salt pork and bacon).....	2	to 4 pounds.
Sugar, molasses, jellies.....	5	to 7 pounds.
Lean meat, poultry, and fish.....	10	to 15 pounds.
Eggs.....	1½	to 2 dozen.
Coffee, tea, cocoa, salt, baking powder, etc., as needed.		

This generous food supply provides fully for the nutritional needs of the family and allows considerable variety. It will yield menus much more interesting and appetizing than those of the low-cost dietary, and, what is more important, the body will receive larger quantities of the food elements which contribute to a high degree of health and vigor.

At present retail prices this list of foods may cost the city family from \$15 to \$18 a week. But the farmer with even a low cash income can

furnish his family with this excellent diet if he raises the right kinds of food in the right amounts, and if the housewife preserves the surplus for winter use. On most farms the acres devoted to home food production and the hours devoted to food conservation bring very gratifying returns.

HAZEL K. STIEBELING, *Bureau of Home Economics.*

## MEAT DEMONSTRATIONS INCREASE INTEREST IN SUPPLYING HOME NEEDS

The problem of getting food from producer to consumer economically becomes greatly simplified when the producer is also the consumer. Specialization in certain branches of agriculture, such as cotton growing, has tended to change many farmers from producers to purchasers of their own home meat supplies. Yet, in recent years, meat demonstrations sponsored by extension and other specialists have done

much to acquaint farm families with the practical possibilities of providing a considerable proportion of their home meat supplies.

A typical example is a program of meat demonstrations begun in Texas in the fall of 1930. The activity was inaugurated by the Texas Agricultural Extension Service in cooperation with the



FIGURE 211—Hogs slaughtered and dressed on a farm in Lamb County, Tex., as a result of a meat demonstration in that community in the winter of 1930-31.

Federal Bureau of Animal Industry, working in cooperation with county agents and home demonstration agents of the various localities. The extension specialists staged demonstrations in killing hogs, cattle, and lambs, and preparing meat products from these animals.

### Demonstrations of Killing, Cutting, and Curing Methods

Demonstrations in killing hogs, cutting the carcasses, and curing and otherwise preparing the meat were conducted in 13 counties. These meetings were attended largely by the county and home demonstration agents of the counties involved and others near by, together with many rural leaders who desired to qualify themselves for conducting or assisting in similar demonstrations in their own localities. Each demonstration usually lasted a day and a half.

On the afternoon of the first day instruction was given in proper killing methods, from one to three hogs being killed for this purpose. On the second day the carcasses were cut up, the meat was put down in the cure, lard was rendered, and all by-products, such as sausage, scrapple, headcheese, liver paste, and mincemeat, were prepared by the women present, under the direction of a home-industries specialist.

Such a pork program has become very popular in many counties of the State. Twenty-five county agents conducted pork demonstrations in their own counties after attending and assisting in a district demonstration supervised by the meat specialist.

As a result of the pork program carried on in 12 counties around Lubbock, Tex., a ham and bacon show was sponsored by the South Plains Fair Association and the Lubbock Chamber of Commerce. There were 712 entries of cured and canned meat products, including 112 hams, 71 pieces of bacon, 47 shoulders, 11 samples of sausage, 91 containers of lard, and canned products such as roasts, chops, sausage, and scrapple. In connection with this meat show, a 4-H club fat-calf and pig show was held. The animals were sold at auction at the close of the show, most of them being purchased locally. This combined show was of outstanding value in increasing interest in farm butchering and meat curing. It was also a means of demonstrating what high-quality cured meats really were, as well as how they could be produced. Special killing, cutting, and curing demonstrations were held during the show.

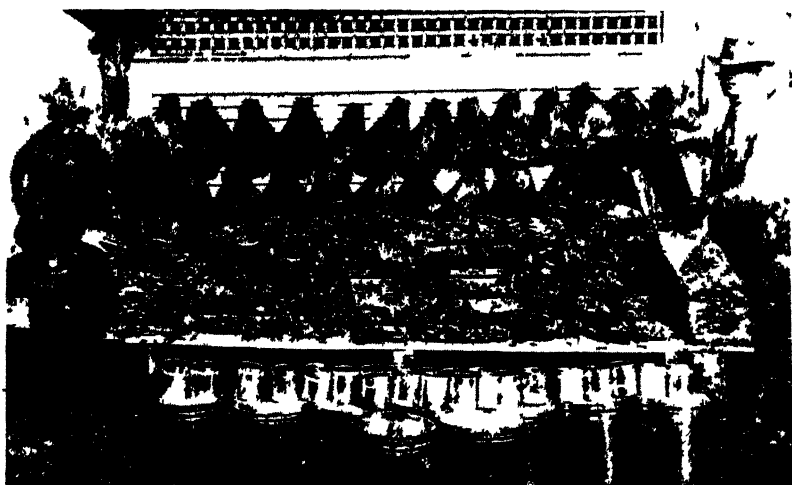


FIGURE 212.—Meat products prepared from 15 hogs on a ranch in Texas. Many ranchmen are keenly interested in the home preparation of their meat supply.

### Beef and Lamb Programs Also Carried On

As much interest has been shown in the beef and lamb programs as in the pork programs, primarily because of the high production of cattle and sheep in the State. The beef and lamb demonstrations have been conducted in almost the same manner as have the pork demonstrations. A variety of beef products—some to be used fresh, some canned, some cured, and some dried—has been advocated. Lamb demonstrations have become especially popular, primarily because of the general lack of knowledge about handling lamb. Learning how to kill the animal and how to remove the pelt is stimulating lamb consumption, particularly in the important sheep-producing areas of the State.

The interest in the meat work, including beef, lamb, and pork, was evident from the number of people attending the meetings, as many as 125 people assembling to witness the demonstrations in most counties. As a result of these activities Texas farmers and ranch owners are increasing the production of their home meat supply. (Figs. 211, 212, and 213.) Agricultural agents report that many farm-

ers who previously kept no hogs on their farms now fatten from one to five or even more for home use. For many families home-canned beef was made available for the first time during the summer of 1931.

### Meat Demonstrations Held in Cities

Interest in the meat program has not been confined to the farmers and ranchmen of the State. Meat demonstrations have been conducted also in towns and cities. Some were held to acquaint retailers with new cutting methods, others to furnish city housewives with



FIGURE 213—Neatly wrapped and labeled meat prepared for sale by a group of farmers in the south plains of western Texas

information on selecting and buying both lamb and beef. A survey taken in four large towns in Texas during the spring of 1931 revealed that the consumption of lamb had increased as much as one-third after special lamb demonstrations had been given there.

Though the interest in meat demonstrations in cities is noteworthy, the principal aim of the program in Texas has been to encourage a better-balanced meat supply for farm and ranch homes. In many instances pork had been utilized almost exclusively, and oftentimes the supply lasted only a few months. To encourage a more varied and adequate diet throughout the year, the present recommendations include beef and lamb as well as pork, and also other meats such as chicken and fish. The needs of a family of five adults appear to be well supplied by approximately two hogs weighing about 225 pounds each, one beef animal weighing about 550 pounds, and two lambs weighing approximately 85 pounds each.

ROY W. SNYDER, *Bureau of Animal Industry.*

### COTTON IS UTILIZED AS NEW FOUNDATION MATERIAL FOR MAKING HOOKED RUGS

The program of the division of textiles and clothing of the Bureau of Home Economics includes projects that stress effective ways of using cotton and wool fabrics. In many cases the studies utilize materials already available and suggests ways of using them in the home to produce the best results. Whenever fabrics satisfactory for a particular purpose are not on the market, new ones are developed if a definite use for them is seen. An example of this is the recent development of an inexpensive cotton material for the foundation of hooked rugs.

Requests for such material were received from several Southern States where making rugs of this kind has become an established home industry. Until recently burlap has been used almost universally for such foundations but it has not been wholly satisfactory and there was a need for a more suitable fabric. The requests were prompted also

by a desire to find another use for a home-grown fiber. As a result, the Bureau of Agricultural Economics and the Bureau of Home Economics, working cooperatively, set up specifications for experimental fabrics, had them woven and then subjected them to scientific and practical tests.

Modifications were made in the original specifications until a satisfactory fabric was obtained. (Fig. 214.) It is 40 inches wide, the same yarn is used for both the warp and the filling, and has the same number of threads per inch fillingwise as warpwise. It has been sized lightly and then calendered to hold the fuzzy ends close to the yarn and to make the material easier to use. The new fabric possesses all the desirable characteristics of the best quality burlap and in addition is as strong in the warp as in the filling yarns.

#### Comparisons With Other Materials

In Table 13 the cotton material is compared with the various kinds of burlap ordinarily used. The cotton is almost identical in construction with the art burlap which is the grade found in many high-quality commercial rug patterns. The thread count, weight per square yard, and thickness are practically the same, but the tensile strength of the two materials differs considerably.

The cotton warp shows a strength of 126.4 pounds as compared with 85.6 pounds in the burlap; but the filling yarns of the burlap are stronger than those in the cotton. These figures indicate that the burlap is unevenly balanced and it seems logical to assume that the warp yarns would break sooner than the filling. This is always a serious defect in any fabric. Also the jute fiber in the burlap is known to deteriorate rapidly when exposed to moisture or sunlight, and under ordinary conditions of wear to become brittle and lose much of its strength, whereas cotton fabrics offer greater resistance to moisture and sun.

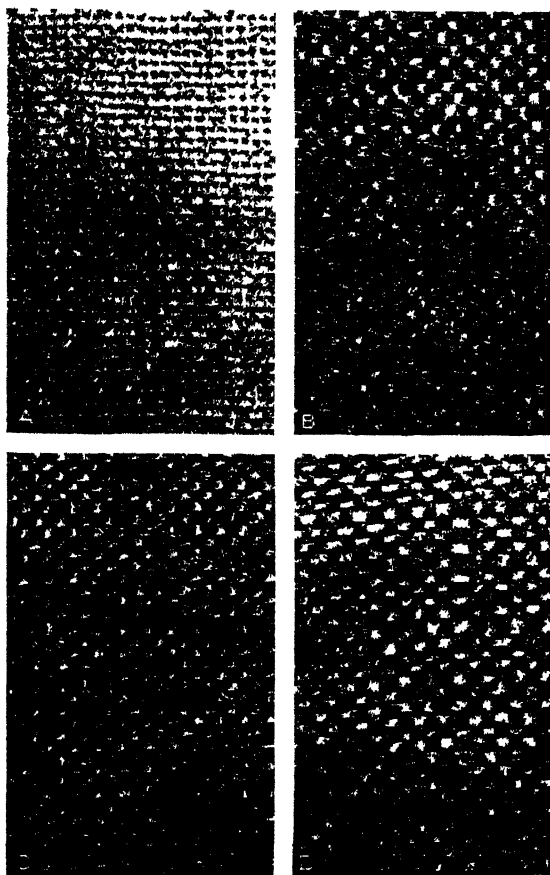


FIGURE 214 — A, Cotton material recently developed for use as foundation material for hooked rugs, B, art burlap, C, upholstery burlap, D, burlap bagging

TABLE 13.—*Comparison of a new cotton material with the various kinds of burlap ordinarily used for hooked-rug foundations*

Fabric	Weave	Thread count per inch		Weight per square yard	Tensile strength per inch <sup>1</sup>		Thickness
		Warp	Filling		Warp	Filling	
		Number	Number	Ounces	Pounds	Pounds	Inch
Cotton material.....	Plain	14	14	18.1	137	133	0.085
Art burlap.....	do	12	12	11.5	85.6	176.2	.026
Upholsterers' burlap.....	do	13	13	8.4	105	97.5	.081
Burlap bagging.....	do	12	12	8.4	69 0	56.8	.036

<sup>1</sup> Strip samples 1 inch in width used for tensile strength tests.

Besides satisfying physical requirements, the new material meets certain practical demands made of any foundation fabric. It takes a design readily, remains taut in the frame during the hooking process and carries any type of filler that the rug maker wishes to use. The weave permits the yarns to slip apart easily to admit the needle and springs back to hold the loops in place. In order to judge the possibilities of the cotton material and the ease with which it could be handled, complete rugs were made using various kinds of fillers.

BESS M. VIEMONT, *Bureau of Home Economics.*

## FOOD-QUALITY STUDIES ELICIT FACTS THAT SERVE AS GUIDE TO PRODUCERS

"Standards for consumers" and "consumers' information" are becoming familiar terms, and with good reason. It is desirable for the consumer to know what contributes to quality or what constitutes a standard for every product he is selecting. But standards can not be set up arbitrarily. The characteristics of any product, manufactured or grown, are determined largely by production conditions as well as by variety. For this reason, the best way to aid in the present effort to increase consumers' information is to help the producer find out how to develop quality characteristics in his product. This is the aim of several studies set up in the food utilization section of the Bureau of Home Economics. Many times an investigation of this kind must begin with an analysis of differences in certain properties that contribute to quality. This is a step toward finding out the reason for variations, which step in turn leads to recommendations for modifying certain characteristics. In the case of natural food products such as rice and potatoes the findings of such studies are of greatest concern to the producer because he must apply them for the benefit of the consumer.

### Rice Varieties Differ in Cooking Qualities

Because of differences noted in the cooking qualities of rice, a study has been made of eight native-grown rices. These eight varieties comprise the major part of domestic rice now on the market for cooking purposes.

A preliminary study bore out the general observation that rices when cooked by the same method differ greatly in wholeness and stickiness of the grain. Tests then made showed that different rices required dif-

ferent lengths of time for satisfactory cooking. This fact is of significance to the producer because it warns him not to mix varieties in marketing rice. The native rices studied were ranked by the use of a score card, in the order of their desirability for boiling. Some varieties are much better than others for boiled rice, in which the aim is whole, distinct grains. The fact that both the method and the variety of rice influence the cooked product is of interest to home makers. The best variety of rice may be ruined by being boiled too rapidly or for too long a time, while rice with poor cooking qualities may be so handled in cooking as to give a fairly desirable result.

Samples of each lot of rice are being held in storage, and will be studied each year to determine the effect of aging on both quality and cooking behavior.

At the present time the rice used in commercially canned soup is Patna rice, which is imported duty free from India. To be desirable for use in canned soup a rice must give a clear liquid, a firm, whole kernel, and leave little deposit in the bottom of the can. A comparison of eight native-grown rices with the imported Patna for use in canned soups showed that Rexoro, an American-grown Patna, was the only one that approached the Patna in desirability for this purpose. (Fig. 215.)

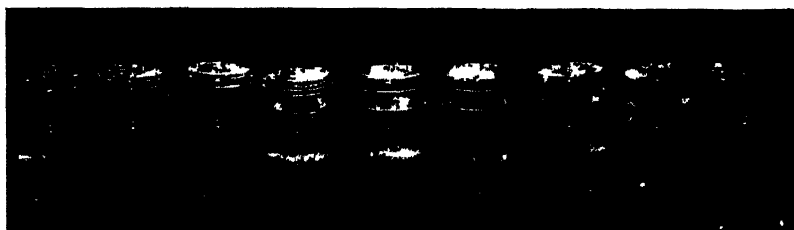


FIGURE 215.—Rice varieties used in canned soups. Patna at extreme left; Rexoro next. Note clearness of these as compared with other samples

The other native rices rank in about the same order for soup as they ranked for boiled rice. The fact that the Rexoro does not serve quite as well as the Patna would seem to indicate, that variety alone does not cause the difference. The cause may be cultural methods, it may be aging, it may be milling. Further study to clear up this point is under way.

#### Potato Production and Storage Methods Affect Cookery

A study on potatoes has been set up, cooperatively among the Bureaus of Home Economics, Plant Industry, and Chemistry and Soils, to determine the relation of such factors as fertilizer ratios, breeding, and storage upon the cooking qualities of potatoes. The results of cooking tests show that the temperature of storage has a marked effect on the quality of potatoes for deep-fat frying and other methods of cooking. A low storage temperature increases the amount of sugar in the potatoes so that when they are fried they become too brown, even when cooked under proper conditions. This is very undesirable in the manufacture of potato chips for market, as well as in preparing them for the home. If potatoes are stored at approximately 60° F. they develop the best frying qualities.

Soils and fertilizers, climatic conditions, and breeding, as well as storage conditions, all play an important part in the development of desirable cooking qualities in potatoes. The determination of these

facts is an important step toward the development of superior products. Such information is already being used in producing potatoes with special characteristics. The interesting results of studies of this type on potatoes should be the stimulus for similar projects to find out what makes for high quality in other vegetables.

### Meat Tested for Palatability

Another study which has been under way for several years was set up to determine factors which influence the palatability of meat. This investigation is a cooperative project among the Bureaus of Home Economics, Animal Industry, and Agricultural Economics; 26 State agricultural experiment stations; and several other livestock and meat agencies. Animals are being produced under experimental conditions for the purpose of tracing the influence of such factors as breeding, sex, age, and feed on the meat when it is served. The food utilization section cooperates with the States in developing methods of cooking meat, cooks samples from experimental animals in preparation for palatability tests, and assists with the judging. As a part of this study 2,500 legs of lamb, 1,000 rib cuts of beef, and 600 pork roasts have been cooked and tested for palatability. The findings of this study are pointing the way to methods of obtaining high-quality meat as judged by palatability tests on the cooked product.

Thus the stepping-stone to better consumer information is through detailed investigations which are of primary concern to the producer. Many facts determined along the way can be immediately applied by the home maker. Practical information from the three projects just described has come out in the form of popular leaflets, as well as in radio talks, press releases, and magazine articles.

FLORENCE B. KING, *Bureau of Home Economics.*

### LEISURE OF HOME MAKERS STUDIED FOR LIGHT ON STANDARDS OF LIVING

A family's standard of living is usually judged by the size of its income and the ways in which it spends its money. But the amount of leisure time which the members of the family enjoy and the ways in which they use this leisure are almost equally revealing.

It is the use of the home maker's time which tells most about the family's standard of living. For home makers differ more in regard to leisure than do the members of any other group in the population. They are more often sorely overworked, and more often unduly underworked, than are the men of the family or the other women. At one extreme is the wage-earning mother who combines a job outside of the home with caring for her family. And at the other end of the scale is the true "lady of leisure," who has nothing to do but give directions to a staff of paid workers. The great majority of home makers, of course, fall well within these two extremes. For them the day's work consists in doing their own housekeeping in their own homes. How much leisure time do these women have, and how do they use it?

Some light is thrown on this question by a study made by the Bureau of Home Economics of the use of time of 1,041 home makers living in different parts of the country. More than half of these women, 642, lived on farms, and 287 others were rural women living in the open country or in villages of less than 2,500 population. The remaining

112 home makers lived in towns of less than 50,000 population. None of these women had full-time jobs outside of the home, and only a small proportion had any paid household help. Each home maker kept a detailed record of how she spent her time through the seven days of a week which was typical of her household life.

TABLE 14.—Average daily distribution of time among various activities by 642 farm home makers, 287 other rural home makers, and 112 urban home makers in towns of from 2,500 to 50,000 population

Kind of activity	Average time spent daily by—					
	Farm home makers		Other rural home makers		Urban home makers	
<b>Work:</b>	<i>H.</i>	<i>m.</i>	<i>H.</i>	<i>m.</i>	<i>H.</i>	<i>m.</i>
Home making.....	7	23	7	20	7	18
Farm work.....	1	19		27		04
Other work.....		05		14		09
Total.....	8	47	8	01	7	31
<b>Personal needs:</b>						
Sleep and rest.....	8	47	8	59	8	53
Eating meals.....	1	19	1	18	1	17
Dressing and other personal care.....		50		55	1	01
Total.....	10	36	11	10	11	11
<b>Leisure:</b>						
Informal social life.....	1	01	1	11	1	09
Reading.....		58	1	02	1	11
Meetings, study, church, community work.....		38		41		49
Other leisure activities.....		53	1	07	1	25
Transportation to and from home.....		26		29		29
Total.....	3	56	4	30	5	04
Actively not clearly reported.....		21		19		15
Entire day.....	24		24		24	

What do these records show as to the time these home makers spent in leisure activities? The answer depends, of course, on what is meant by leisure. If we consider it simply as the time not spent in work and in sleeping, eating, dressing, and other personal care, we find that the farm home makers had 3 hours 56 minutes a day of leisure, on the average, or 27 hours 32 minutes a week. For the other rural home makers, the average was 4 hours 30 minutes daily, and for the home makers living in towns, 5 hours 3 minutes.

Table 14 shows how this leisure time was distributed by each of these groups of home makers, and how the rest of the 24 hours of the day was used. The average size of family of the farm group was 4.4 persons, of the other rural group 4.1 persons, and of the urban group 4.

### Similarity Among Groups

The most striking point shown by the table is the similarity between these groups of home makers. The time spent in housekeeping and care of the family is almost identical, averaging 7 hours 23 minutes daily for the farm women, 3 minutes less for the other rural women and 5 minutes less for the urban group. The chief difference appears in the time spent in farm work—that is, in the care of poultry and milk, in vegetable gardening, and in similar tasks. With the farm women these tasks required an average of 1 hour 19 minutes daily, while only 27 minutes was spent by the other rural women, and almost no time,

of course, by those living in towns. In each of the groups, a few minutes a day was given, on the average, to other kinds of work.

Because of their additional farm tasks, the farm home makers' working day was considerably longer than that of the town home makers, averaging  $8\frac{1}{4}$  hours as compared with  $7\frac{1}{2}$  hours. For the other rural home makers the average fell at just 8 hours.

This extra time which the farm home makers spent in work accounts, of course, for their smaller amount of leisure. They show, to be sure, a few minutes less each day for sleep and rest and for other personal care, but the time given to personal needs differed surprisingly little for the three groups of women. All of them met the standard of 8 hours of sleep, with nearly an hour's leeway of additional rest. And all of them spent a little more than 2 hours a day in eating meals, dressing, and similar personal care. The time which remained out of the 24 hours of the day was what was left for leisure.

Is 4 to 5 hours a day a reasonable amount of leisure? Or to put the question in more familiar terms, is  $7\frac{1}{2}$  to  $8\frac{1}{4}$  hours a day a reasonable amount of work?

At first glance the working days of these home makers seem to conform fairly closely to modern standards. But it must be remembered that the 8-hour day of industry applies to only a 6 or even a 5 day week, while the daily averages for these women cover the full 7 days of the week, Sunday included. In order to compare these figures with the working hours of other types of workers, we must consider the working week as a whole. For the farm group this amounted to  $61\frac{1}{2}$  hours on the average, and for the urban group to  $52\frac{1}{2}$  hours, with the other rural group intermediate.

### Majority of Farm Women Overworked

Even these town housewives, therefore, have on the average a heavier working week than most industrial workers at the present time. And the majority of the farm women are appreciably overworked; almost three-fourths of them worked more than 56 hours a week, and one-fifth worked over 70 hours. These working hours, moreover, must be maintained with little leeway throughout the 52 weeks of the year. Unlike most occupations, home making does not usually include vacations or slack seasons, or even holidays. And the leisure which it does allow seldom leaves the home maker free from her job for more than a few hours at a time.

Turning to the ways in which these housewives used their leisure, the averages for the three groups are again surprisingly similar. About a fourth of the time was spent in reading, and another fourth in talking (visiting), playing cards, and similar informal recreation with other people. Around three-quarters of an hour a day, on the average, or five hours a week, went to attending meetings and classes, studying, going to church, and doing various kinds of church and community work. Going back and forth in connection with their leisure activities occupied approximately half an hour daily; and the remaining small amount of time had to suffice for all other kinds of recreation—attending movies, concerts, and entertainments, going to teas, dances, and similar social affairs, taking drives, listening to the radio, writing to friends, and myriad other interests. Clearly no one can claim that the home makers included in this study are frivolling away their time.

HILDEGARDE KNEELAND, *Bureau of Home Economics.*

## FOOD-COMPOSITION DATA AID RESEARCH WORKERS TO INTERPRET FOOD STANDARDS

The home maker's problem of planning meals is not only a matter of providing what the family likes and can afford, but of providing at the same time foods that will furnish nutrients needed in a balanced diet. Not many home makers, however, have the time or inclination to study the abstract principles of nutrition. Most of them want to be certain that they get enough of the right kinds of foods, without being bothered with counting calories or estimating the protein and iron content of their diet. It remains for nutrition specialists, therefore, to figure out the food requirements for persons of different ages and to supply home makers with the necessary information in such convenient and familiar terms as bread, meat, fruits, vegetables, and milk, which go to make up the daily menu.

To do this it is necessary to know the composition of foods. Some are good sources of protein, some contain fats and carbohydrates, and others are valuable for their mineral content and their vitamins. Some contain much water, some are concentrated. Some contain indigestible material which does not count as food. In order to make possible the translation of body needs into terms of actual foods, the Bureau of Home Economics maintains a service which collects and analyzes all available information on composition of foods. This material is put out in the form of circulars made available to nutrition workers and teachers, in order that they may have accurate data as a basis for instruction on food selection.

The demand for information of this kind is increasing, judging by the inquiries the Bureau of Home Economics receives. Requests are frequent for data on the composition and fuel value of fresh fruits and vegetables not included in the usual tables in textbooks. Publications already issued contain data on the composition of these groups of food in so far as the protein, carbohydrate, fat, water, and total ash are concerned. These tables have been prepared after analyses from hundreds of sources have been collected, evaluated, reviewed, and summarized.

### Work on Minerals Less Advanced

The work on minerals has not progressed so far, but the collection of calcium, phosphorus, and iron determinations in foods has already proved helpful to nutrition workers who are seeking data on the mineral content of certain food materials. One of the most urgent needs is information about the iron content of foods, because of the importance of iron in preventing and correcting certain types of anemia. After reviewing the available literature for data on iron in food materials, a list of foods that are especially rich in iron has been prepared and a chart is being issued for use in classrooms, lectures, and exhibits.

The results of these studies are made available to the general public through popular bulletins or news releases on foods or food selection. Publications of this type usually include some discussion of the nutritive value of particular foods or their place in the diet. Such discussion is based upon knowledge of food composition derived from chemical and biological studies. When the reader of a department news story or a bulletin on food for children is told that liver is a very nutritious food, or that leafy vegetables should be included in the diet frequently, he probably does not realize how much experimental work must be done in order to make such a simple dietary recommendation.

CHARLOTTE CHATFIELD, *Bureau of Home Economics.*

## VITAMIN CONTENT OF MANY FOODS MEASURED BY TESTS WITH RATS

Foods may be grouped according to their importance as sources of energy, protein, or minerals. By selecting from these different groups it is possible to assure a reasonably balanced diet. There is another important factor to consider, however, that is, the vitamin content. What foods contain the different vitamins? And how much loss of vitamin content occurs in the preparation of those foods for use? To answer these questions, both for housewife and for dietitian, the nutrition laboratory of the Bureau of Home Economics is carrying on extensive investigations.

Earlier laboratory studies show that animals can not live on a diet of chemically pure foods. These studies led to the discovery of vitamins, substances present in small amounts in most of the natural foods. It is now known that there are at least six of these vitamins and that five are essential to the health of human beings. They seem to act as regulators of certain body processes and if any one of them is missing from



FIGURE 216.—A, Young rat as he appeared after two months on a diet lacking vitamin A; B, his brother, after receiving the same diet for six weeks, was then given butter as a source of vitamin A for two weeks. Photographs taken at the same time.

the diet a characteristic diseased condition develops. Pellagra, for example, is the result of such a dietary deficiency. This disease may be corrected, as well as prevented, by including in the diet certain foods known to contain the pellagra-preventive factor.

When a rat is deprived of vitamin A it soon stops growing and after several weeks, during which time it

has become listless, thin, and anemic, the appearance of eye lesions is noted. These become progressively worse as time goes on. Sooner or later the animal dies, and autopsy reveals the presence of infection not apparent from observation of the live animal. Pus sacs are found in the glands of the tongue, mouth, and neck, as well as in the ears. If vitamin A is added to the diet of such an animal before the disease has progressed too far, i. e., before the tissues have been permanently injured, recovery is rapid and apparently complete. (Fig. 216.)

As soon as the importance of vitamins was discovered, chemists and nutritionists began to search out the foods containing them in most considerable quantities. Not until recently, however, have any of these factors been isolated in pure form so that they could be identified chemically. This meant that the usual chemical methods could not be used in measuring them and other methods had to be devised for this purpose.

### Measuring Vitamin Values

It had been found that when an animal like the rat is kept on a diet that is deficient in one vitamin there is a quantitative relation between

the amount of that factor present and the rate of decline of the animal. Or conversely, if the animal has been kept on a deficient diet until the characteristic diseased condition has developed, and then is fed a food rich in the missing vitamin, the rate of recovery depends upon the amount of the vitamin in the added food. (Fig. 217.) By describing as a unit the amount of a vitamin that will produce a given effect in a "standardized" rat, it is possible to determine the relative vitamin values of any food that the rat will eat. We have such values for vitamin A and vitamin C, and a few for vitamin B. Some of those for the more common foods are given in Table 15.



FIGURE 217.—A, Photograph of a young rat kept for 24 weeks on a diet lacking vitamin G; B, same rat six weeks later during which time it was given a diet rich in vitamin G

TABLE 15.—Values of vitamins A and C in some common foods

Edible portion	Units per ounce		Edible portion	Units per ounce	
	Vitamin A	Vitamin C		Vitamin A	Vitamin C
Apples.....	15	3	Liver.....	2,800	-----
Bananas.....	100	5	Milk (whole).....	65	1
Beans, string.....	150	5	Oranges.....	20	15
Cabbage.....	10	20	Peas, raw.....	175	15
Carrots.....	940	2	Peas, canned.....	175	10
Eggplant.....	20	2	Potatoes.....	10	3
Eggs.....	550	( <sup>1</sup> )	Sweet potatoes.....	85	3
Escarole.....	6,000	3	Spinach.....	1,400	25
Grapes.....	20	2	Tomatoes.....	170	15
Lemons.....	( <sup>1</sup> )	15	Turnips.....	5	4
Lettuce.....	50	2			

<sup>1</sup> Practically none.

As yet we can not say what are the body requirements for the different vitamins. One authority on nutrition says that an adult needs at least 4,500 units of vitamin A per 3,000 calories, while another designates 45 units of vitamin C as optimum. By reference to Table 15 it is easy to see how to calculate what foods to eat to supply the needed vitamin A (escarole, liver, spinach, carrots, and eggs head the list), or what may be used in place of orange juice to supply vitamin C (spinach, cabbage, tomatoes, lemons, fresh peas).

Information of this kind, as rapidly as it can be determined and brought together from all the laboratories now engaged in such researches, is being published in department circulars, news articles, and radio talks.

HAZEL E. MUNSELL, *Bureau of Home Economics.*

## STANDARDS FOR CHILDREN'S CLOTHES STRESS COMFORT, SIMPLICITY, AND SELF-HELP

Expenditures for food can be definitely checked against standards set up in terms of the demands of good nutrition. There is no such check or guide for clothing expenditures. Unquestionably clothing choices have been largely determined by such human qualities as vanity, personal taste, and prejudice rather than comfort and health or even artistic design. It is believed that if a more definite relationship between clothing and health could be shown, some progress could be made in the establishment of fundamental clothing standards. The need for such standards is found in the size and fluctuation in the yearly clothing bill and in the seasonal nature of the industry.

In beginning such studies the Bureau of Home Economics disclaims any attempts to influence standards for adult clothing. It seemed possible, however, to make a start by a study of children's clothing, especially from the point of view of comfort, ease of care, and simplicity of design, applying the principles of modern psychology along with the working out of certain physical and physiological factors.

No satisfactory methods for furnishing definite data on the influence of clothing on health have been developed. Animals can not be used in these studies as they can in the study of nutrition. While it is known that the amount and kind of clothing influence heat regulation and probably the resistance to infection, definite facts are difficult to obtain. The collection of information on kinds and amounts of clothing recommended by physicians and nurses in close contact with children showed great diversity of recommendation. A study of the weight of clothing worn by children compared with similar data collected 10 years earlier gave definite evidence that the weight of clothes worn had decreased, probably in part as a result of better heating in homes and in part as a result of a different point of view on the amount of clothing required.

The development of nursery schools where groups of young children are brought together under similar conditions and under trained supervision, offered an opportunity for studies of the problem. Beginning with the evident requirements of comfort and lack of restriction, designs for children's clothing were worked out, and garments were made and tested by observation under normal, active conditions of wear.

The care of small children who require frequent change of garments, brought from the nursery-school attendants the suggestion that designs be developed that make it possible for the children to enter into this necessary activity at an earlier age. Interested as nursery-school workers are in the mental development of children as well as in their physical care, they saw in dressing and undressing an opportunity for coordination of mental and physical development which might well be utilized in child training. Based on these suggestions, a number of designs have been prepared and tested, from which definite recommendations have been made for sun suits, little girls' dresses, little boys' clothes, rompers, and outdoor play suits. These, at least, are a beginning toward setting standards which embody comfort, lack of constriction, and ease of care, for children's clothes.

These are to be followed as soon as more definite methods can be worked out, by studies to show the influence of certain physical characteristics of clothing on physiological reactions of the child.

LOUISE STANLEY, *Bureau of Home Economics.*

## LAUNDRY TESTS UNDER SCIENTIFIC CONTROL SHOW HOW TO PREVENT DAMAGE

The average household has a considerable investment in its bed linen, table linen, and other fabrics that must be laundered. Therefore anything that can reduce or offset the wear and tear of the laundering process is an important home economy. The Bureau of Home Economics is conducting a series of tests and studies with different sheetings which have been manufactured from known grades of raw cotton under supervision of the Bureau of Agricultural Economics.

An obvious aim in such a project would be the prevention of scorch. It is easy to recognize damage by scorch when the iron has been hot enough to cause a stain. There may have been just enough heat, however, to cause a tendering of the fabric which is quite invisible. If this



FIGURE 218 —Household ironer with which fabrics can be ironed at a known temperature and pressure

occurs often, the fabric soon wears out. The experimental work thus far has developed a method of measuring the degree of scorch, as follows:

Before any fabric is ironed, the manufacturer's sizing or dressing is removed by the use of enzymes and a light washing process. Breaking-strength tests show that this treatment does not materially alter the mechanical properties of the cloth. All samples to be ironed are conditioned in a controlled humidity room, in which a relative humidity of 65 per cent is maintained. The moisture content of representative samples can then be carefully determined.

While the fabrics are being passed through the experimental ironer shown in the illustration (fig. 218), the temperature of the heated metallic shoe is obtained by an electrical device, in which the thermocouple replaces the ordinary mercury thermometer. The cloth being ironed is in contact with the heated metal under known pressure for about two and one-half seconds. The factors of time and pressure are

not varying here as in hand ironing, where they depend upon the operator. Uniform pressure conditions in the ironer can be maintained, however, only by careful attention to the contact between the metal shoe and the revolving roll. The latter takes the place of the board in hand ironing, and must be kept uniformly well padded.

The material used at present on the experimental ironer consists of two layers of regular knit cotton padding, two layers of napped, double-faced cotton felt, and a muslin cover. In actual service, only muslin which has been preshrunk can be used satisfactorily on account of the moisture absorption from the fabrics being ironed. The preshrunk knit cotton padding offered to the laundry trade would doubtless give an additional advantage.

### Scorched Covers Should Be Changed

The covers need to be changed as soon as they develop even a slight indication of scorch. Fabrics ironed on scorched covers are liable to

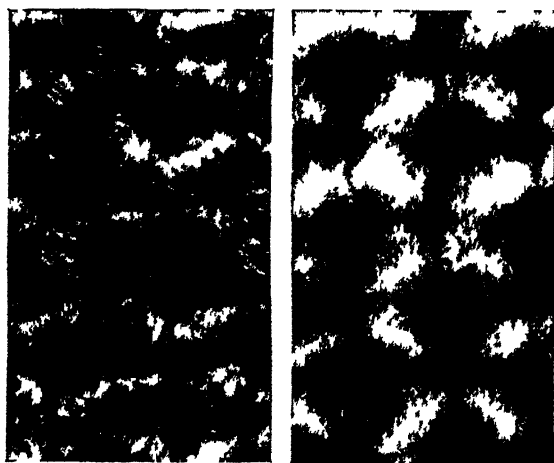


FIGURE 219—Cotton sheeting material treated with methylene blue solution, magnified 50 times. A, Scorched material, B, unscorched material

acquire yellow stains in the presence of moisture and the oxidized or burned cotton material. This is obvious in the yellow coloration taken on by hot water in which a moderately scorched cover has been allowed to stand for a short time. Any padding used with such covering should be well aired, as it has usually acquired an odor which is soon communicated to a fresh cover and to the materials that are being ironed. The padding of the ironer should be unrolled and

fluffed up frequently to avoid any hard packing often occurring after continued service. While the roll should be uniformly firm, it should yield somewhat to the different materials that are being laundered.

In this connection it should be noted that no one fabric will be absolutely uniform throughout in thickness or surface. This becomes more evident from the manner in which scorch effects have appeared on the fabric shown in the magnified illustration. (Fig. 219.) It will be apparent that in the case of a light scorch the fibers on the surface act as a protection to the yarns underneath. When they constitute the only scorched part of the fabric, the breaking strength of the cloth is not noticeably changed. This is particularly evident in heavy, thick sheetings ironed under low pressure at a comparatively high temperature.

The yarns illustrated in Figure 220 were taken from other parts of the fabrics shown in Figure 219. In order to make the scorched condition more visible, the fabrics were treated with a solution of methylene blue dye. The comparative resistance of the unscorched fabric to

this treatment may be seen in Figure 219, B. This fact is made use of, but with a different procedure, in a quantitative method of estimating chemical damage in the ironed cloth.

The weakening of the fibers taken from a scorched yarn is well illustrated in Figure 221. Both the unscorched fiber and the scorched were treated with the same chemical solution (Fleming and Thaysen solution). The comparative degradation of the scorched fiber is plainly evident.

In this study of ironed fabrics various methods are being used for detecting chemical change. The viscosity determination is one of the most satisfactory of these methods. In this test the ironed sample is ground and dissolved in a cuprammonium solution. The time rate of flow of this cotton solution in an accurately measured, fine tube is then obtained. The more tendered the cloth sample, the more rapid will be the flow of the solution through the tube.

#### Color Measurements of Surface Changes

When the mechanical and the chemical damage appear very slight, color measurements are employed to detect certain surface changes. A scorched condition is indicated by the smaller amount of violet light reflected from the sample. By a modified spectrophotometric method, determinations of the light reflected from the cloth are made for definite regions in the red, in the yellow, in the green, in the blue, and in the violet. While a deep scorch will obviously lessen the total amount of light reflected from a fabric, a faint scorch in a sample will be evident mainly from the smaller amount of blue-violet light reflected.

Observations made on the ironer when it is set for a pressure of from 1 to 1½ pounds to the square inch, show changes in certain 4-ounce sheetings for temperatures as low as 473° F. The surface of the roll just before it touches the hot metal is then at a temperature of from 99° to 104° (slightly warm to the hand). If the roll is allowed to turn against the heated surface so that its surface temperature is slightly

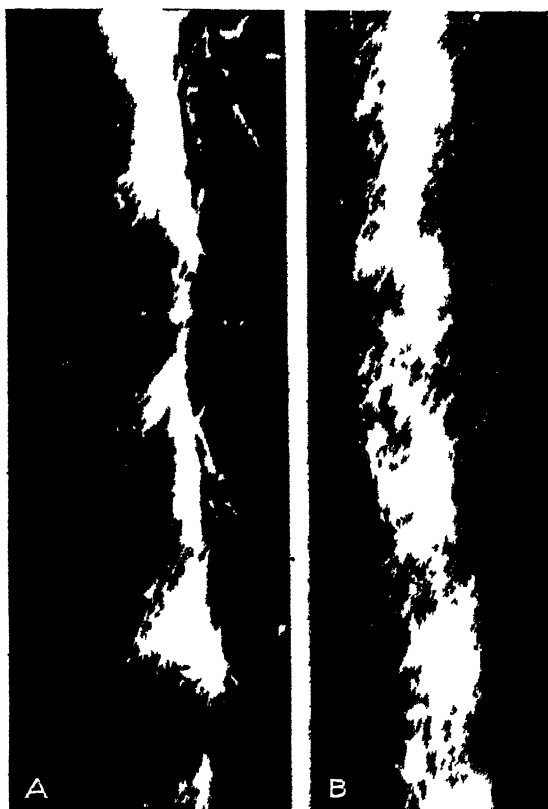


FIGURE 220—Cotton yarns from sheeting material which have been treated with methylene blue solution. A, Scorched yarn, B, unscorched yarn

more than doubled, these same sheetings may be affected at a temperature about 45° lower. The first measurement described with the cooler roll is doubtless more comparable with hand ironing. It is of interest to note here that under service conditions for a period of time,



FIGURE 221—Cotton fibers treated with Fleming and Thaysen's solution, magnified 640 times  
A, Scorched fiber, B, unscorched fiber

the washing procedure appears to influence the scorching temperature of a fabric. Further investigation in this field should yield considerable information of practical value.

K. MELVINA DOWNEY, *Bureau of Home Economics.*

# AGRICULTURAL STATISTICS

*Prepared under the direction of the Statistical Committee Joseph A. Becker, chairman, Lewis B. Flohr, secretary, S. W. Mendum, L. M. Davis, E. J. Work-  
ing, and B. C. Boree.*

In the interests of economy, many tables formerly regularly included in this section of the Yearbook are omitted this year and the number of years has been reduced for many series. Recent data for the omitted tables are for the most part available in current publications and can be supplied upon direct request. For data for earlier years not covered in this Yearbook, the user is referred to past issues.

The statistical section of this Yearbook brings together what seem from experience to be the most important agricultural statistics for the United States, and for the world so far as the agriculture of this country is concerned. Historical and geographical series have been given.

For greater detail on individual commodities than can be shown in the Yearbook, the Statistical Bulletin series of the department may be consulted.

For current statistics to supplement Yearbook statistics, the following sources should be used: (1) Crops and Markets—a monthly publication of the department carrying the latest current statistics on agriculture in the United States; (2) Foreign Crops and Markets—issued weekly by the Bureau of Agricultural Economics and devoted to current world statistics of crops, livestock, and markets; (3) foreign commodity news—published by the Bureau of Agricultural Economics and showing the latest world information on single commodities and released as important information is received; (4) market news reports of the Bureau of Agricultural Economics—issued daily, weekly, monthly, quarterly, or at irregular intervals, at Washington and at the principal markets.

The crop and livestock reporting service estimates acreage, condition of crop, yield per acre, production, and farm prices of crops, and numbers, production, farm prices, and values of livestock and livestock products. The organization of this work outside of the crop-reporting board and the office force in Washington consists of 41 State field offices, each with an agricultural statistician in charge. There is one field office for the New England States, one for Maryland and Delaware, and one for Utah and Nevada.

Acreages for the year 1909 are as reported by the Bureau of the Census, acreages in 1919, 1924, and 1929 are based upon the census supplemented by State enumerations. In the intercensal years, from 1910 to 1915, estimated acreages were obtained by applying estimated percentages of decrease or increase to the published acreage in the preceding year. The estimates from 1916 to 1918, 1920 to 1923, 1925 to 1928, 1930, and 1931 are based upon acreage changes from year to year as shown by a sample of over 2 per cent of the crop acreages in each year, supplemented by State enumerations. Yields per acre are estimates based upon reports of one or more farmers in each agricultural township on the average yield per acre in their localities. For 1929, 1930, and 1931 these reports have been adjusted to be comparable with yields derived from the 1929 census. For certain crops, yields from 1919 to 1928 have been adjusted to be comparable with the census yields of 1919, 1924, and 1929. For these same crops, revisions of acreage have been made for the period 1919 to 1928 essentially to the acreages reported by the censuses of 1919 and 1929. Production is acreage times yield per acre.

Estimates of farm stocks, sales, quality, crop condition, and miscellaneous information concerning crops are based either upon sample data or upon estimates of crop reporters for their localities.

The term "commercial" is used in connection with certain crop estimates to distinguish some part of the total production of a crop. Except for indicating that the entire production is not represented in the estimate, "commercial" does not have the same meaning in each instance where used. The commercial apple estimate, for example, represents that portion of the total apple crop which is sold or available for sale for consumption as fresh fruit. That portion of the crop which is used for cider, vinegar, canning, evaporating, or other manufacture is not included in the commercial estimate as defined in this case. The commercial orange and grapefruit crops in Florida represent the portion shipped or to be shipped as differentiated from the portion canned, juiced, sold, or consumed locally, wasted, etc. Until recently, cherry estimates represented the commercial sales in certain States and included only the quantities shipped to market or utilized by canners, cold packers, and other processors. The estimates now include the total production in these commercially important States. Estimates of commercial truck-crop production are concerned only with those areas growing the crops primarily to supply the large consuming markets more or less distant from the producing center. Production in home and market gardens, intended principally for local sale, is excluded. Similarly with truck crops grown for commercial canning or manufacture the estimates include only amounts grown for use by canning or packing establishments and exclude amounts canned in the home. The truck and canning crop estimates are designed to include the total quantity produced on the commercial acreage in the areas concerned, whether or not the entire crop finds a market or a use.

Monthly estimated prices received by producers on the specified dates are based upon reports from special price reporters, who are mostly country dealers, on the average price paid to farmers and do not relate to any specified grade.

Farm values of crops as shown are mostly computed by applying the December 1 farm price to the total production. These prices are reported by the crop reporters, who are mostly farmers. The average price received for the portion of the crop sold may be greater or less than this price, depending upon the prices previous and subsequent to December 1, and the amount of the crop sold at the different prices. For commercial truck and canning crops, and for certain fruit crops, the prices shown are the estimated seasonal averages of the prices received by growers at the shipping point, the cost of the container included if a customary requirement of delivery.

Numbers of livestock on farms on January 1, 1920, and 1925, are based upon the census enumeration as of that date, supplemented by enumerations by State agencies, such as assessors and brand inspection boards, and by records of shipments during 1920 and 1925. Numbers on January 1, 1930, give weight in so far as feasible to the numbers reported by the census of 1930 which was as of April 1, with allowance for indicated changes between January 1 and April 1. In the intercensal years, from 1911 to 1916, the numbers of livestock were obtained by methods identical with those used for crop acreages. Estimates from 1917 to 1919, from 1921 to 1924, from 1926 to 1930, for 1931 and 1932 are based upon a sample of over 2 per cent, supplemented by trends derived from assessors' enumerations, reports of brand inspection boards, market movements, and stockyard receipts. The census bases are not always comparable from one decade to another, because of changes of dates and classifications.

The average value per head on January 1 is estimated from reports of correspondents relating to livestock in their vicinity. These tend to reflect inventory values as distinguished from the monthly prices which relate to sales. The farm value on January 1 is computed by applying the average value per head to the number on farms.

The Federal market news service supplies much of the information on market prices and movements. The leased-wire system in use by the service extends from the Atlantic to the Pacific and reaches most of the important markets of the country. At each of the branch offices commodity specialists gather information regarding the supply, the demand, and prices for the products on which they report. They observe the sales actually made on the markets and are constantly in touch with the traders, who in many instances give them access to their office records in order that they may have specific information on which to base their reports. Car-lot shipments and market receipts of crops and livestock products are reported by officials and agents of railroads, express companies, and boat

lines, or compiled from trade publications. At markets where shipments by automobile truck have become of increasing importance, receipts by truck are reported by dealers and distributors. Data on receipts, slaughter, and shipments of livestock are obtained from monthly reports submitted by the public stockyards. Data on cold-storage stocks are obtained directly from all important cold-storage warehouses, and data on commercial stocks of grain are reported by boards of trade, etc. Leaf-tobacco stocks are reported directly by dealers and manufacturers.

Where a weighting factor is available market prices as shown are weighted averages; but in many cases a weighting factor is not available, and the prices shown are usually the means of ranges of quotations without reference to quantity. The weighted market prices of grain are based on the number of carload sales reported. The weighted average price of hogs at Chicago is based on total sales of butcher and packer hogs to slaughterers.

Prices derived from different sources may not be strictly comparable, although for most general purposes they are satisfactory. The data as to commercial stocks and movements of various commodities are as nearly complete as practicable and feasible, and are considered fairly representative.

The statistics of grain grading are based on work done by licensed grain inspectors located throughout the United States.

Statistics of acreage and production in foreign countries are compiled as far as possible from official sources and are therefore subject to whatever errors may result from shortcomings in the reporting and statistical services of the various countries. Inaccuracies also result from differences in nomenclature and classification in foreign countries. Except where otherwise stated, pre-war data refer to pre-war boundaries. Yields per acre are calculated from acreage and production, both rounded to thousand units, and are therefore subject to a greater possibility of error when calculated for countries with small acreage.

The tables of international trade cover substantially the international trade of the world. The total imports and the total exports in any one year can not be expected to balance, although disagreements tend to be compensated over a series of years. Among the sources of disagreement are: The different periods covered by the "year" of various countries; imports received in the year subsequent to the year of export; lack of uniformity in classification of goods as among countries; different trade practices and varying degrees of failure in recording countries of origin and ultimate destinations; different practices in recording reexported goods; and different methods of treating free ports. The exports given are domestic exports and the imports given are imports for consumption whenever it is possible to distinguish such imports from general imports, that is, "special" or net instead of general. General imports are all imports reported. In foreign countries "special" trade is imports for consumption, or net imports, or imports less reexports. In the United States imports for consumption are those entered for actual consumption and include withdrawals from warehouse for consumption. Special or net figures are used in the international trade tables for the following countries: Belgium, Denmark, Egypt, Irish Free State, China, Dutch East Indies, France, and United Kingdom. In the United States trade tables and wherever United States figures are given, they are domestic exports and general imports unless otherwise specified. While there are some inevitable omissions, there may be some duplication because of reshipments which do not appear as such in the official reports. In the trade tables, figures for the United States include Alaska, Porto Rico, and Hawaii, but not the Philippine Islands.

As an aid to the comprehension and use of these statistics, the following table of weights, measures, and conversion factors will be useful:

*Weights, measures, and conversion factors used in the Department of Agriculture*

Commodity	Unit <sup>1</sup>	Weight in pounds	Commodity	Unit <sup>1</sup>	Weight in pounds
Alfalfa seed.....	Bushel.....	60	Peanut oil.....	Gallon.....	7.5
Apricots.....	do.....	48	Potatoes.....	Bushel.....	60
Barley.....	do.....	48	Rapeseed.....	do.....	50
Beans, dry.....	do.....	60	Rice.....	do.....	45
Buckwheat.....	do.....	48	Rice, rough.....	do.....	60
Clover seed.....	do.....	60	Rice, cleaned.....	do.....	56
Corn, shelled.....	do.....	56	Rye.....	do.....	56
Corn, ear, husked.....	do.....	70	Rye flour.....	Barrel.....	196
Cotton, ginned.....	Bale.....	$\left\{ \begin{array}{l} 2478 \\ 500 \end{array} \right.$	Soybean oil.....	Gallon.....	7.5
Cottonseed oil.....	Gallon.....	7.5	Spelt.....	Bushel.....	40
Cranberries.....	Barrel.....	100	Timothy seed.....	do.....	45
Flaxseed.....	Bushel.....	56	Tomatoes.....	do.....	56
Grapefruit.....	Box.....	270	Wheat.....	do.....	60
Hempseed.....	Bushel.....	44	Wheat flour.....	Barrel.....	196
Lemons.....	Box.....	274	Almonds, apricots, aspara-		
Milk.....	Gallon.....	8.6	gus, snap beans, beet sugar,		
Oats.....	Bushel.....	32	broomcorn, cabbage, cane		
Oranges (California).....	Box.....	270	sugar, cottonseed, figs,		
Oranges (Florida).....	do.....	280	grapes, hay, plums, prunes,		
Orchard grass.....	Bushel.....	14	raisins, sugar, sugar beets,		
			sugar cane, walnuts.....	Short ton.....	2,000

Commodity	Equivalents
Almonds.....	1 pound shelled is equivalent to about 3½ pounds unshelled.
Apples.....	1 pound dried is equivalent to about 5 pounds of fresh.
Barley flour.....	1 barrel (196 pounds) is equivalent to about 9 bushels of barley.
Buckwheat flour.....	1 barrel (196 pounds) is equivalent to about 7 bushels of buckwheat.
Filberts.....	1 pound shelled is equivalent to about 2.22 pounds unshelled.
Malt.....	1.1 bushel (34 pounds) is equivalent to about 1 bushel of barley.
Oatmeal.....	1 barrel (196 pounds) is equivalent to about 10½ bushels of oats.
Do.....	18 pounds is equivalent to about 1 bushel of oats.
Peanuts.....	1 pound shelled is equivalent to about 1½ pounds unshelled.
Peaches (California).....	1 pound dried is equivalent to about 5½ pounds fresh.
Prunes.....	1 pound dried is equivalent to about 2½ pounds fresh.
Rye flour.....	1 barrel (196 pounds) is equivalent to about 6 bushels of rye.
Raisins.....	1 pound is equivalent to about 4 pounds of grapes.
Wheat flour.....	1 barrel (196 pounds) is equivalent to about 4.7 bushels of wheat. <sup>4</sup>
Walnuts (English).....	1 pound shelled is equivalent to about 2.38 pounds unshelled.

<sup>1</sup> Standard bushel used in the United States contains 2,150.12 cubic inches; the gallon, 231 cubic inches.

<sup>2</sup> Net.

<sup>3</sup> Gross.

<sup>4</sup> Due to changes in milling processes, equivalents have varied as follows: 1790-1879, 5; 1880-1903, 4.75; 1909-1917, 4.7; 1918-1919, 4.5; 1920, 4.6; 1921-1931, 4.7.

# STATISTICS OF GRAINS

TABLE 1.—Wheat, all: Acreage, production, value, exports, etc., United States, 1849, 1859, 1866-1931

Year	Acreage harvested	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value, basis Dec. 1 farm price	Spring wheat, price per bushel at Chicago, year beginning July <sup>1</sup>	No. 2 red winter wheat, price per bushel at Chicago, year beginning July <sup>2</sup>	Foreign trade, including flour, year beginning July <sup>3</sup>			
								Domestic exports <sup>4</sup>	Imports <sup>5</sup>	Net exports <sup>6</sup>	
										Total	Percentage of production
	1,000 acres	Bush.	1,000 bushels	Cts.	1,000 dolls.	Cts.	Cts.	1,000 bushels	1,000 bushels	1,000 bushels	Per cent
1849			100,486			66		7,536	2,913	5,701	5.7
1859			173,105			90		17,213	7,488	12,720	7.3
1866	15,424	9.9	152,000	152.7	232,110	219	94	12,647	3,093	10,528	7.1
1867	18,322	11.6	212,441	145.2	306,387	198	145	26,823	2,014	24,550	11.6
1868	18,460	12.1	224,087	108.5	243,083	134	123	29,717	1,890	28,814	12.6
1869			287,746								
1869	19,181	13.6	260,147	76.5	199,025	98	84	53,901	1,286	53,126	20.4
1870	18,693	12.4	235,835	94.4	222,767	116	84	52,574	867	52,195	22.1
1871	19,944	11.6	230,722	114.5	264,076	124	100	38,996	2,411	37,587	16.3
1872	20,858	12.0	249,997	111.4	278,522	121	111	62,015	1,841	50,705	20.3
1873	22,172	12.7	281,255	106.9	300,670	116	103	91,510	2,117	90,413	32.1
1874	24,967	12.3	308,103	86.3	265,881	98	98	72,913	369	72,845	23.6
1875	26,329	11.1	292,136	89.5	261,397	106	86	74,751	1,664	74,508	25.5
1876	27,627	10.5	289,856	97.0	280,743	122	92	57,044	366	57,148	19.3
1877	26,278	13.9	364,194	105.7	385,089	111	121	92,142	1,391	92,028	25.3
1878	32,109	13.1	420,122	77.6	325,814	90	95	150,503	2,074	150,253	35.8
1879	35,430	12.0	459,483								
1879	35,430	14.1	499,893	110.6	552,884	110	99	181,307	487	181,951	36.4
1880	37,987	13.1	498,550	95.1	474,202	100	105	188,308	212	188,250	37.8
1881	37,709	10.2	383,280	119.2	456,880	128	115	122,371	867	123,211	32.1
1882	37,067	13.6	504,185	83.4	445,602	105	118	150,113	1,088	150,000	26.8
1883	36,456	11.6	421,086	91.1	383,649	93	102	113,823	33	113,892	27.0
1884	39,478	13.0	512,785	64.5	330,862	79	83	135,282	213	135,301	26.4
1885	34,189	10.4	357,112	77.1	275,320	81	88	96,611	389	96,569	27.0
1886	36,806	12.4	457,218	68.7	314,226	77	76	156,685	283	156,760	34.3
1887	37,642	12.1	456,329	68.1	310,613	75	75	122,616	596	122,524	26.8
1888	37,336	11.1	415,868	92.6	385,248	95	88	90,944	136	91,030	21.9
1889	35,430	12.9	458,374								
1889	35,430	12.9	434,383	69.5	301,869	81	86	112,488	163	112,507	25.9
1890	34,048	11.1	378,097	83.3	315,112	97	89	109,017	596	109,054	28.8
1891	37,826	11.5	584,504	83.4	487,463	89	96	228,465	2,463	228,941	39.2
1892	39,552	13.3	527,987	62.2	328,331	73	78	196,088	968	195,672	37.1
1893	37,934	11.3	427,553	53.5	228,599	60	68	168,498	1,183	167,531	39.2
1894	39,425	13.1	516,485	48.9	252,709	57	57	148,630	1,439	147,740	28.6

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board; italic figures are census returns.

<sup>1</sup> Spring wheat prices compiled as follows: 1849-1870, from Chicago newspapers, quoted; 1849, spring wheat, contract grade; 1859, standard spring, contract grade; 1866-1870, No. 1 spring, contract grade; 1871-1884, annual reports of Chicago Board of Trade, quoted as No. 2 spring, contract grade; 1885-1896, Bartel's Red Book, quoted as No. 2 spring; January, 1897-June, 1904, Chicago Daily Trade Bulletin, average of daily ranges; quotations used; January-October, 1897, No. 3 spring; November, 1897-June, 1898, No. 3 spring, hard varieties; July, 1898-June, 1904, No. 1 spring; from February, 1897, "free on board" was used when available; July, 1904-December, 1918, Bartel's Red Book, average of daily ranges, quoted as No. 1 northern. Subsequently from the Chicago Daily Trade Bulletin and are averages of the daily cash price per bushel weighted by car-lot sales.

<sup>2</sup> Prices, 1839-1898, are from the Price Current Grain Reporter 1924 Yearbook, p. 4, and are average cash prices for calendar years; subsequently from the Chicago Daily Trade Bulletin and are averages of the daily cash price per bushel weighted by car-lot sales.

<sup>3</sup> Compiled from Commerce and Navigation of the United States, 1849, 1859, 1866-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1926; January and June issues, 1927-1931. Wheat flour converted to terms of grain on the following basis: 1849, 1859, 1866-1879, 1 barrel is the product of 5 bushels of grain; 1880-1908, 4.75; 1909-1917, 4.7; 1918-19, 4.5; 1920, 4.6; 1921-1931, 4.7.

<sup>4</sup> Includes flour milled from imported wheat.

<sup>5</sup> Includes wheat imported for milling in bond and export.

<sup>6</sup> Total exports (domestic plus foreign) minus total imports.

<sup>7</sup> Imports of flour estimated.

TABLE 1.—Wheat, all: Acreage, production, value, exports, etc., United States, 1849, 1859, 1866-1931—Continued

Year	Acreage harvested	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value, basis Dec. 1 farm price	Spring wheat, price per bushel at Chicago, year beginning July	No. 2 red winter wheat, price per bushel at Chicago, year beginning July	Foreign trade, including flour, year beginning July			
								Domestic exports	Imports	Net exports	
										Total	Percentage of production
	1,000 acres	Bush.	1,000 bushels	Cts.	1,000 dolls.	Cts.	Cts.	1,000 bushels	1,000 bushels	1,000 bushels	Per cent.
1895	40,848	13.9	569,456	50.3	286,539	61	62	130,099	2,117	130,345	22.9
1896	43,916	12.4	544,193	71.7	390,346	70	67	143,787	1,545	145,725	27.3
1897	46,046	13.3	610,254	30.9	493,683	91	86	221,143	2,060	220,955	36.2
1898	51,007	15.1	772,163	58.2	449,022	71	90	227,240	1,875	227,905	29.4
1899	52,689	12.5	658,534								
1899	52,689	12.1	636,051	53.6	372,982	70	72	190,772	320	190,749	30.0
1900	51,387	11.7	602,708	62.0	373,578	75	76	220,653	603	220,723	36.6
1901	52,473	15.0	788,638	62.6	493,766	74	72	239,212	121	239,137	30.3
1902	49,649	14.6	724,808	63.0	456,851	77	75	207,835	1,080	208,016	28.7
1903	51,632	12.9	663,923	69.5	461,439	90	83	124,977	229	124,926	18.8
1904	47,825	12.5	596,911	92.4	551,738	114	100	46,319	3,266	43,613	7.3
1905	49,389	14.7	726,819	74.6	542,543	89	88	101,089	273	100,849	13.9
1906	47,800	15.8	756,775	68.2	501,316	84	77	150,597	602	150,594	19.9
1907	45,116	14.1	637,981	58.5	552,074	107	90	166,625	530	166,304	20.1
1908	45,970	14.0	644,656	92.2	594,128	116	96	116,373	475	115,901	18.0
1909	44,263	15.4	683,379								
1909	44,262	15.8	700,434	98.4	689,108	114	110	89,173	845	88,465	12.6
1910	45,681	13.9	635,121	88.3	561,051	107	102	71,338	1,175	70,164	11.0
1911	49,543	12.5	621,338	87.4	543,063	110	90	81,891	3,445	78,447	12.6
1912	45,814	15.9	730,267	76.0	555,280	94	103	145,159	1,304	143,938	19.7
1913	50,184	15.2	763,380	79.9	610,122	93	88	147,955	2,402	145,306	19.2
1914	53,541	16.6	891,017	98.6	878,680	132	108	335,702	723	335,162	37.6
1915	60,469	17.0	1,025,801	91.9	942,303	120	113	246,221	7,264	239,591	23.4
1916	52,316	12.2	636,313	180.3	1,019,968	196	168	205,962	24,960	181,067	28.5
1917	45,089	14.1	636,655	200.8	1,278,112	227	225	132,579	31,215	102,776	16.1
1918	59,181	15.6	921,438	204.2	1,881,826	234	222	287,402	11,289	276,615	30.0
1919	73,089	12.9	945,408								
1919	75,694	12.8	967,979	214.9	2,080,056	276	224	222,030	5,511	216,671	22.4
1920	61,143	13.6	833,027	143.7	1,197,263	198	223	366,313	57,682	312,625	37.5
1921	63,696	12.8	814,905	92.6	754,834	136	125	282,566	17,375	265,590	32.6
1922	62,317	13.9	867,598	100.7	873,412	122	114	224,900	20,031	205,079	23.6
1923	59,650	13.4	797,394	92.3	736,006	119	102	159,880	28,079	131,892	16.5
1924	50,862	15.7	800,877								
1924	52,535	16.5	864,428	129.9	1,123,086	156	153	260,803	6,201	254,695	28.5
1925	52,367	12.9	676,785	141.6	983,364	106	164	108,065	15,679	92,669	13.7
1926	56,369	14.8	831,381	119.8	996,308	140	133	219,160	13,264	205,964	24.8
1927	53,784	14.9	873,374	111.6	979,813	140	140	206,269	16,734	190,575	21.7
1928	58,272	15.7	914,376	97.0	887,194	118	138	163,687	21,442	142,301	15.6
1929	62,671	13.0	812,573	103.5	841,385	127	130	153,245	12,956	140,361	17.3
1930	61,138	14.0	858,160	60.0	514,247	84	86	131,636	19,059	112,496	13.1
1931 <sup>10</sup>	54,949	16.2	892,271	44.3	395,600						

<sup>8</sup> Weighted average for 11 months.<sup>9</sup> Weighted average for 10 months.<sup>10</sup> Preliminary.

# STATISTICS OF GRAINS

579

TABLE 2.—Wheat, winter and spring: Acreage sown and harvested, and production, United States, 1910-1931

Year	Winter wheat				Durum wheat			Other spring wheat		
	Acreage sown in preceding fall	Acreage harvested	Average yield per acre	Production	Acreage harvested	Average yield per acre	Production	Acreage harvested	Average yield per acre	Production
	1,000 acres	1,000 acres	Bushels	1,000 bushels	1,000 acres	Bushels	1,000 bushels	1,000 acres	Bushels	1,000 bushels
1910	31,659	27,329	15.9	434,142						
1911	32,645	29,162	14.8	430,656						
1912	33,229	26,571	15.1	399,919						
1913	33,274	31,699	16.5	523,561						
1914	37,158	36,008	19.0	684,990						
1915	42,431	41,308	16.3	673,947						
1916	39,245	34,709	13.8	480,553						
1917	38,359	27,257	15.1	412,901	2,396	10.9	26,009	15,436	12.8	197,745
1918	43,126	37,130	15.2	565,099	3,313	15.2	50,235	18,738	16.3	306,104
1919	51,483	50,494	15.1	760,377	3,782	8.2	30,996	21,418	8.2	176,606
1920	44,861	40,016	15.3	610,597	4,409	10.9	48,200	16,718	10.4	174,230
1921	45,625	43,414	13.8	600,316	5,276	10.1	53,324	15,006	10.7	161,285
1922	47,930	42,358	13.8	586,878	5,792	15.1	87,669	14,167	13.6	193,051
1923	46,091	39,508	14.5	571,777	5,295	10.0	52,834	14,856	11.6	172,783
1924	38,916	35,656	16.6	592,259	3,826	16.3	62,373	13,053	16.1	206,796
1925	39,951	31,346	12.8	402,070	4,280	14.4	61,651	16,741	12.7	213,044
1926	39,887	36,987	17.0	627,433	4,774	9.2	43,981	14,598	11.0	159,967
1927	43,373	37,723	14.7	552,747	5,484	14.4	79,100	15,577	15.8	246,527
1928	47,317	36,213	16.0	578,673	6,836	14.2	97,281	15,223	15.7	238,913
1929	43,340	40,580	14.2	577,009	5,571	9.8	54,710	16,520	10.9	180,854
1930	43,630	39,509	15.2	601,840	4,745	12.2	57,719	16,884	11.8	198,601
1931 <sup>1</sup>	43,149	41,009	19.2	787,465	2,869	6.4	18,395	11,071	7.8	86,411

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.

TABLE 3.—Winter wheat: Percentage of acreage abandoned, average 1919-1928, annual 1927-1931<sup>1</sup>

State	Average, 1919-1928	1927	1928	1929	1930	1931	State	Average, 1919-1928	1927	1928	1929	1930	1931
	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.		P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
N. Y.	3.1	1.0	6.0	2.0	8.0	0.5	Ky.	13.8	3.0	65.0	3.0	3.5	3.0
N. J.	3.4	1.0	5.0	1.0	1.0	0.5	Tenn.	7.7	5.0	28.0	4.0	4.0	1.5
Pa.	2.8	2.5	9.0	1.0	2.5	4.0	Ala.	8.5	10.0	15.0	3.0	4.0	1.0
Ohio	13.2	3.0	64.0	1.0	15.0	1.0	Miss.	21.7	10.0	40.0			
Ind.	11.0	3.0	60.0	4.0	7.0	1.0	Ark.	8.7	20.0	30.0	10.0	5.0	2.5
Ill.	11.7	5.5	62.0	8.0	9.0	0.5	Okla.	9.5	20.0	7.0	6.0	14.0	4.5
Mich.	3.6	2.0	10.0	1.5	3.0	1.5	Tex.	16.4	24.0	23.0	7.0	16.0	4.5
Wis.	11.2	2.5	32.0	2.0	5.0	4.0	Mont.	26.8	12.0	18.0	15.0	23.8	50.0
Minn.	11.8	2.0	45.0	3.5	8.0	3.0	Idaho	6.4	4.0	5.0	3.0	4.0	4.0
Iowa	5.5	2.5	22.0	3.0	1.9	3.5	Wyo.	10.0	12.0	10.0	12.0	15.0	22.0
Mo.	7.9	11.0	32.0	4.0	7.0	1.0	Colo.	21.9	30.0	40.0	20.0	24.0	15.0
S. Dak.	17.6	10.0	40.0	5.0	5.0	25.0	N. Mex.	36.7	89.0	45.0	20.0	52.0	2.0
Nebr.	9.0	4.0	10.0	9.0	2.5	4.5	Ariz.	5.0	1.0	1.0	2.0	2.1	0
Kans.	13.9	20.0	15.2	5.0	5.0	2.0	Utah	3.4	3.0	2.0	2.5	3.0	5.0
Del.	2.4	1.0	1.0	1.0	1.0	5.0	Nev.	3.3	0	1.0	1.5	0	0
Md.	2.3	1.5	3.0	1.5	1.5	6.0	Wash.	14.8	6.0	6.0	10.0	28.0	4.0
Va.	2.7	2.0	6.0	1.5	1.3	2.0	Oreg.	9.2	1.0	3.0	3.0	5.0	5.0
W. Va.	4.6	1.5	15.0	1.5	1.0	2.5	Calif.	16.8	3.0	9.0	20.0	10.0	38.0
N. C.	2.7	3.0	7.0	2.0	4.5	1.5							
S. C.	4.8	6.0	12.0	5.0	4.0	2.0							
Ga.	10.2	8.0	15.0	6.0	6.0	3.0	U. S.	11.7	13.0	23.5	6.4	9.4	5.0

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> For entire season, planting to harvest. Includes winter abandonment, which is estimated on May 1 of each season.

TABLE 4.—Wheat, all: Acreage harvested and production, by States, average 1924-1928, annual 1928-1931

State and division	Acreage harvested					Production				
	Average, 1924-1928	1928	1929	1930	1931 <sup>1</sup>	Average, 1924-1928	1928	1929	1930	1931 <sup>1</sup>
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
Maine.....	5	4	2	2	2	114	80	46	44	44
Vermont.....	1	1	1	1	1	28	16	18	20	21
New York.....	306	316	242	224	211	5,599	4,702	3,864	4,086	5,811
New Jersey.....	58	60	54	53	49	1,215	1,200	1,107	1,246	1,323
Pennsylvania.....	1,129	1,108	987	986	909	20,450	17,171	17,278	21,682	19,987
North Atlantic.....	1,499	1,489	1,286	1,266	1,172	27,406	23,169	22,313	27,078	26,686
Ohio.....	1,551	872	1,564	1,612	1,723	27,335	9,475	30,508	28,712	50,744
Indiana.....	1,576	910	1,568	1,584	1,678	25,302	10,040	25,909	28,527	43,327
Illinois.....	2,202	1,563	2,093	1,921	1,935	34,737	22,939	30,831	35,086	45,076
Michigan.....	893	887	790	705	711	17,232	14,202	13,682	16,160	18,446
Wisconsin.....	121	104	96	99	88	2,587	2,141	1,881	2,063	1,544
Minnesota.....	1,841	1,532	1,421	1,366	1,224	27,366	22,964	20,471	22,626	18,011
Iowa.....	422	452	426	432	381	8,096	8,723	7,977	8,869	7,594
Missouri.....	1,559	1,511	1,534	1,275	1,497	20,054	19,194	15,400	17,838	20,933
North Dakota.....	9,763	10,810	10,440	9,896	6,204	121,692	155,358	99,950	108,471	32,717
South Dakota.....	2,685	3,380	3,583	3,808	2,796	31,783	34,928	34,799	45,279	15,831
Nebraska.....	3,223	3,672	3,700	3,939	3,455	55,300	69,919	55,403	71,557	58,376
Kansas.....	9,797	10,473	12,081	12,357	12,632	135,319	177,883	148,544	166,702	230,868
North Central.....	35,631	36,146	39,296	38,994	34,334	506,804	547,716	485,350	551,890	561,467
Delaware.....	101	102	106	105	91	1,885	1,836	2,014	2,048	2,138
Maryland.....	514	530	506	481	404	9,638	8,745	9,108	11,063	9,696
Virginia.....	661	673	657	591	603	9,373	9,768	8,607	9,160	13,266
West Virginia.....	132	122	104	105	113	1,826	1,686	1,362	1,838	2,373
North Carolina.....	439	444	353	265	339	5,211	5,150	3,636	2,862	4,407
South Carolina.....	59	64	52	34	53	723	800	520	340	689
Georgia.....	100	94	48	26	49	1,101	1,034	408	273	637
South Atlantic.....	2,006	2,029	1,826	1,607	1,652	29,756	28,909	25,655	27,584	33,206
Kentucky.....	222	125	204	202	242	2,778	1,000	2,530	2,828	4,840
Tennessee.....	413	422	280	202	252	4,635	3,714	2,492	2,222	4,410
Alabama.....	6	4	2	2	4	70	44	20	20	50
Mississippi.....	5	3				76	60			
Arkansas.....	29	22	17	18	36	350	253	158	203	475
Oklahoma.....	3,867	4,413	4,576	3,935	4,407	50,566	59,576	51,251	37,382	74,919
Texas.....	1,570	2,016	2,970	3,029	3,635	20,944	22,176	44,550	31,804	57,433
South Central.....	6,112	7,005	8,049	7,388	8,576	79,414	86,823	101,001	74,459	142,127
Montana.....	3,622	4,275	4,419	4,217	2,182	57,954	77,998	41,290	35,313	14,684
Idaho.....	1,026	1,160	1,294	1,244	1,059	25,580	28,792	28,835	30,691	19,041
Wyoming.....	193	243	341	343	243	3,332	3,897	4,394	4,014	2,146
Colorado.....	1,374	1,339	1,539	1,632	1,394	18,395	18,554	17,934	23,356	10,552
New Mexico.....	157	186	320	211	284	2,364	2,054	4,436	1,904	5,112
Arizona.....	41	47	19	22	24	1,015	1,269	475	616	672
Utah.....	234	257	265	276	257	5,490	6,861	5,304	6,892	4,679
Nevada.....	16	18	14	13	14	424	482	352	328	319
Washington.....	2,112	2,271	2,295	2,305	2,357	42,922	48,644	42,721	38,273	40,843
Oregon.....	994	1,027	1,075	1,027	945	20,473	23,318	21,500	23,621	17,662
California.....	645	730	633	592	456	11,330	16,380	11,014	12,136	6,475
Western.....	10,415	11,603	12,214	11,883	9,215	189,785	228,259	178,254	177,149	128,785
United States.....	55,663	58,272	62,671	61,138	54,949	833,165	914,876	812,573	858,160	892,271

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.

# STATISTICS OF GRAINS

581

TABLE 5.—Wheat, winter: Acreage harvested and production, by States, average 1924-1928, annual 1928-1931

State and division	Acreage harvested					Production				
	Average, 1924-1928	1928	1929	1930	1931 <sup>1</sup>	Average, 1924-1928	1928	1929	1930	1931 <sup>1</sup>
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
New York.....	297	306	238	214	201	5,431	4,529	3,728	3,916	5,126
New Jersey.....	53	60	54	53	49	1,215	1,200	1,107	1,246	1,323
Pennsylvania.....	1,124	1,101	976	976	898	20,375	17,066	17,080	21,472	19,756
North Atlantic	1,479	1,467	1,263	1,243	1,148	27,021	22,795	21,915	26,634	26,205
Ohio.....	1,546	864	1,554	1,601	1,713	27,219	9,331	30,303	28,498	50,534
Indiana.....	1,569	900	1,553	1,569	1,663	25,199	9,900	25,624	28,242	43,072
Illinois.....	2,054	1,261	1,978	1,800	1,836	32,078	17,654	23,681	32,400	43,146
Michigan.....	888	882	780	694	701	17,138	14,112	13,494	15,962	18,220
Wisconsin.....	62	42	30	32	24	1,367	777	660	656	456
Minnesota.....	156	165	162	167	152	3,024	2,640	3,402	3,340	3,192
Iowa.....	368	411	379	337	333	7,552	8,014	7,201	8,127	6,826
Missouri.....	1,548	1,496	1,522	1,263	1,490	19,906	18,999	15,220	17,682	20,800
South Dakota.....	104	105	75	96	185	1,361	1,260	1,065	1,632	1,166
Nebraska.....	3,038	3,492	3,506	3,751	3,339	52,456	66,667	52,590	68,043	57,431
Kansas.....	9,782	10,433	12,034	12,310	12,618	135,180	177,361	145,018	166,185	239,742
North Central	21,133	20,051	23,573	23,670	24,054	322,471	326,745	326,258	371,367	493,591
Delaware.....	101	102	106	105	91	1,885	1,836	2,014	2,048	2,138
Maryland.....	514	530	506	481	404	9,638	8,745	9,108	11,063	9,696
Virginia.....	661	678	657	591	608	9,373	9,758	8,607	9,180	13,266
West Virginia.....	132	122	104	105	113	1,826	1,586	1,362	1,838	2,373
North Carolina.....	439	444	383	265	339	5,211	5,150	3,636	2,892	4,407
South Carolina.....	59	64	52	34	53	723	800	520	340	689
Georgia.....	100	94	48	26	49	1,101	1,034	408	273	637
South Atlantic	2,006	2,029	1,826	1,607	1,652	29,756	28,909	25,655	27,584	33,206
Kentucky.....	222	125	204	202	242	2,773	1,000	2,530	2,828	4,840
Tennessee.....	413	422	280	202	252	4,635	3,714	2,492	2,222	4,410
Alabama.....	6	4	2	2	4	70	44	20	20	50
Mississippi.....	5	3				76	60			
Arkansas.....	29	22	17	18	36	350	253	158	203	475
Oklahoma.....	3,867	4,413	4,576	3,935	4,407	50,566	59,576	51,251	37,332	74,919
Texas.....	1,570	2,016	2,070	3,029	3,635	20,944	22,176	44,550	31,804	57,433
South Central	6,112	7,005	8,049	7,388	8,576	79,414	86,823	101,001	74,459	142,127
Montana.....	563	803	624	686	412	9,489	12,045	9,048	6,380	4,120
Idaho.....	447	456	703	731	673	10,253	10,488	14,060	16,813	12,114
Wyoming.....	48	75	132	161	161	777	1,125	1,782	2,012	1,449
Colorado.....	1,069	923	1,204	1,324	1,218	13,289	11,076	13,244	19,198	14,616
New Mexico.....	123	150	288	181	237	1,826	1,500	3,917	1,434	4,626
Arizona.....	41	47	19	22	24	1,015	1,269	475	616	672
Utah.....	143	162	135	194	194	2,940	3,728	2,980	4,268	3,104
Nevada.....	4	4	4	2	3	100	104	112	42	66
Washington.....	1,014	1,424	1,151	875	1,356	24,306	25,600	27,048	19,688	29,832
Oregon.....	751	837	926	833	825	16,150	20,088	18,520	19,159	15,262
California.....	645	780	633	592	456	11,830	16,380	11,014	12,136	6,475
Western.....	4,854	5,061	5,869	5,601	5,579	91,975	113,401	102,180	101,796	92,336
United States.....	38,585	36,213	40,580	39,509	41,009	550,636	578,673	577,009	601,840	787,465

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.

TABLE 6.—Wheat, spring: Acreage harvested and production, by States, average 1924-1928, annual 1928-1931

## SPRING WHEAT OTHER THAN DURUM

State and division	Acreage harvested					Production				
	Average, 1924-1928	1928	1929	1930	1931 <sup>1</sup>	Average, 1924-1928	1928	1929	1930	1931 <sup>1</sup>
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
Maine.....	5	4	2	2	2	114	80	46	44	44
Vermont.....	1	1	1	1	1	28	16	18	20	21
New York.....	9	10	9	10	10	188	173	136	170	185
Pennsylvania.....	<sup>1</sup> 7	7	11	10	10	<sup>1</sup> 125	105	198	210	231
North Atlantic	20	22	23	23	24	385	374	398	444	481
Ohio.....	5	8	10	11	10	116	144	200	214	210
Indiana.....	6	10	15	15	15	102	140	285	285	285
Illinois.....	148	302	115	121	99	2,659	5,285	2,150	2,686	1,930
Michigan.....	5	5	10	11	10	94	90	188	198	220
Wisconsin.....	59	62	66	67	64	1,230	1,364	1,221	1,407	1,088
Minnesota.....	1,472	1,032	1,038	996	946	21,042	14,984	13,909	15,986	13,055
Iowa.....	34	41	47	45	48	544	708	776	742	768
Missouri.....	10	15	12	12	7	149	198	180	156	133
North Dakota.....	5,942	5,690	6,590	6,854	4,318	68,948	78,108	62,605	71,967	21,590
South Dakota.....	1,615	1,933	2,038	2,242	1,774	18,187	19,523	19,769	26,007	9,225
Nebraska.....	185	180	194	188	126	2,844	3,222	2,813	2,914	945
Kansas.....	15	40	47	47	14	139	472	526	517	126
North Central	9,498	9,288	10,182	10,609	7,431	116,054	124,216	104,622	123,029	49,545
Montana.....	3,018	3,443	3,765	3,501	1,750	47,865	65,417	32,002	28,708	10,500
Idaho.....	578	704	591	514	386	15,327	18,304	14,775	13,878	7,537
Wyoming.....	145	168	209	182	82	2,555	2,772	2,612	2,002	697
Colorado.....	305	416	335	308	176	5,106	7,488	4,690	4,158	1,936
New Mexico.....	34	36	32	30	27	537	554	518	420	486
Utah.....	86	95	80	82	63	2,550	3,135	2,344	2,624	1,575
Nevada.....	12	14	10	11	11	325	378	240	286	253
Washington.....	1,098	847	1,144	1,430	1,001	18,617	13,044	15,673	18,590	11,011
Oregon.....	243	190	149	194	120	4,328	3,230	2,980	4,462	2,400
Western.....	5,520	5,913	6,315	6,252	3,616	97,210	114,322	75,834	75,128	36,385
United States.....	15,038	15,223	16,520	16,884	11,071	213,649	238,912	180,854	198,601	86,411

## DURUM WHEAT

Minnesota.....	213	335	221	208	128	3,300	5,360	3,180	3,350	1,764
North Dakota.....	3,821	5,150	3,850	3,042	1,886	52,743	77,250	37,345	36,504	11,127
South Dakota.....	966	1,322	1,470	1,470	837	12,236	14,145	13,965	17,040	5,440
Montana.....	40	29	30	30	20	600	536	240	225	64
4 States.....	5,040	6,836	5,571	4,745	2,869	68,879	97,291	54,710	57,719	18,395

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.<sup>2</sup> 3-year average.

## STATISTICS OF GRAINS

588

TABLE 7.—Wheat: Yield per acre and estimated price per bushel December 1, by States, averages, and annual 1926-1931

ALL WHEAT, INCLUDING DURUM

State and division	Yield per acre							Estimated price per bushel, Dec. 1						
	Average, 1919-1928	1926	1927	1928	1929	1930	1931	Average, 1926-1929	1926	1927	1928	1929	1930	1931
	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
Maine.....	22.1	20.0	18.0	20.0	23.2	22.0	22.0	167	175	175	165	160	105	70
Vermont.....	18.9	20.0	20.0	16.0	18.0	20.0	21.0	136	132	140	131	125	100	80
New York.....	19.3	17.5	20.9	14.9	16.0	18.2	25.2	134	126	126	137	124	79	57
New Jersey.....	19.8	22.0	23.0	20.0	20.5	23.5	27.0	129	132	125	124	123	87	57
Pennsylvania.....	18.0	20.0	18.5	15.5	17.5	22.0	22.0	131	129	127	126	121	80	56
North Atlantic.....	18.4	19.6	19.2	15.6	17.4	21.4	22.8	131.3	129.8	126.6	130.4	121.7	80.4	56.4
Ohio.....	16.2	22.5	18.0	10.9	19.5	17.8	29.5	131	127	125	131	116	76	50
Indiana.....	14.8	20.0	15.5	11.0	16.5	18.0	23.8	128	124	124	124	112	71	45
Illinois.....	16.2	18.0	13.9	14.7	14.7	18.3	23.3	123	122	120	112	111	69	45
Michigan.....	17.8	18.3	21.5	16.0	17.3	22.9	25.9	126	122	120	126	113	73	50
Wisconsin.....	18.2	20.3	21.7	20.6	19.6	20.8	17.5	119	126	117	106	110	73	55
Minnesota.....	13.1	12.9	11.9	15.0	14.4	16.6	14.7	114	123	110	96	106	53	55
Iowa.....	18.7	21.4	18.7	19.3	18.7	20.8	19.9	118	120	117	100	106	65	45
Missouri.....	12.7	15.3	10.0	12.7	10.0	14.0	20.0	126	124	122	121	113	74	45
North Dakota.....	10.8	8.0	12.7	14.4	9.6	11.0	5.3	106	117	103	81	98	51	50
South Dakota.....	10.7	6.1	14.9	10.4	9.7	11.9	5.7	106	118	106	85	93	46	48
Nebraska.....	15.4	13.0	20.3	19.0	15.0	18.2	16.8	112	117	109	94	99	53	40
Kansas.....	13.2	14.8	11.2	17.0	12.3	13.5	19.0	116	119	117	94	100	56	37
North Central.....	13.1	13.3	13.8	15.2	12.4	14.2	16.4	114.2	120.3	112.2	93.7	102.4	57.8	42.4
Delaware.....	16.8	30.0	19.0	18.0	19.0	19.5	23.5	128	130	125	125	116	78	53
Maryland.....	17.4	23.0	17.5	16.5	18.0	23.0	24.0	131	130	127	127	118	77	52
Virginia.....	13.1	16.5	12.2	14.5	13.1	15.5	22.0	137	131	132	135	125	97	58
West Virginia.....	13.2	16.0	13.3	13.0	13.1	17.5	21.0	140	135	137	137	133	102	61
North Carolina.....	10.7	14.1	10.7	11.6	10.3	10.8	13.0	150	143	145	152	141	109	72
South Carolina.....	11.2	16.0	11.0	12.5	10.0	10.3	13.0	161	155	152	161	150	131	83
Georgia.....	10.3	15.0	9.2	11.0	8.5	10.5	13.0	162	160	155	167	155	135	90
South Atlantic.....	13.5	17.7	13.3	14.2	14.0	17.2	20.1	138.3	134.3	134.2	136.9	125.5	89.9	59.1
Kentucky.....	11.6	18.5	9.5	8.0	12.4	14.0	20.0	138	138	135	138	126	91	54
Tennessee.....	10.5	18.0	7.0	8.8	8.9	11.0	17.5	143	136	139	143	132	100	65
Alabama.....	10.6	13.4	10.6	11.0	10.0	10.0	12.5	160	160	155	157	163	135	80
Mississippi.....	14.9	17.0	17.0	20.0	---	---	---	139	129	135	137	---	---	---
Arkansas.....	11.3	13.5	11.5	11.5	9.3	11.3	13.2	131	128	125	122	129	98	52
Oklahoma.....	12.7	17.5	9.0	13.5	11.2	9.5	17.0	117	118	120	100	99	59	38
Texas.....	12.3	18.2	8.7	11.0	15.0	10.5	15.8	122	120	121	110	105	70	41
South Central.....	12.4	17.7	9.1	12.4	12.5	10.1	16.6	120.6	120.4	122.3	105.0	103.2	66.3	40.7
Montana.....	13.3	12.5	20.8	18.2	9.3	8.4	6.7	105	112	96	83	95	48	55
Idaho.....	23.8	23.6	27.6	24.8	22.3	24.7	18.5	103	106	96	80	85	52	46
Wyoming.....	16.8	18.8	18.5	16.0	12.9	11.7	8.8	99	107	94	83	89	50	46
Colorado.....	13.9	12.7	14.2	13.9	11.7	14.3	11.9	106	107	104	85	83	53	43
New Mexico.....	13.6	22.7	10.4	11.0	13.9	9.0	18.0	116	110	119	107	95	61	45
Arizona.....	24.3	25.0	25.0	27.0	25.0	28.0	28.0	141	130	135	130	135	105	66
Utah.....	21.7	23.2	23.5	26.7	20.0	25.0	18.2	107	105	102	98	102	66	54
Nevada.....	24.8	24.0	23.6	26.8	25.1	25.2	22.8	128	116	125	122	128	104	79
Washington.....	19.5	19.4	25.8	21.4	18.6	16.6	17.8	112	116	108	100	107	56	51
Oregon.....	20.7	18.2	25.1	22.7	20.0	23.0	13.7	116	120	112	103	111	58	51
California.....	17.8	18.4	16.8	21.0	17.4	20.5	14.2	127	130	118	118	120	85	65
Western.....	17.2	16.6	21.8	19.7	14.6	14.9	14.0	109.2	113.4	103.1	93.4	101.3	56.3	50.4
United States.....	14.1	14.8	14.9	15.7	13.0	14.0	16.2	114.7	119.8	111.5	97.0	108.5	60.0	44.3
DURUM														
Minnesota.....	14.4	14.0	13.2	16.0	14.3	16.3	14.0	---	---	105	81	97	51	50
North Dakota.....	12.2	9.5	14.0	15.0	9.7	12.0	3.9	---	---	100	73	89	46	46
South Dakota.....	12.4	6.6	16.5	10.7	9.5	12.0	6.5	---	---	102	73	85	42	43
Montana.....	12.7	8.6	20.0	18.5	8.0	7.5	3.2	---	---	97	84	88	42	48
Average.....	12.3	9.2	14.4	14.2	9.8	12.2	6.4	---	---	100.6	71.9	83.4	45.1	45.5

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

TABLE 8.—Wheat: Acreage, yield per acre, and production in specified countries, average 1921-22 to 1925-26, annual 1928-29 to 1931-32

Country	Acreage					Yield per acre					Production				
	Average 1921-22 to 1926-26	1928-29	1929-30	1930-31	1931-32	Average 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32	Average 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32
NORTHERN HEMISPHERE															
North America:	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	Bushels	Bushels	Bushels	Bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
Canada:	22,053	24,119	25,255	24,888	20,115	16.9	33.6	32.5	32.1	30.9	30.4	30.4	30.4	30.4	30.4
United States:	68,115	58,372	62,671	61,138	54,949	13.8	16.7	16.7	13.0	14.0	10.2	10.2	10.2	10.2	10.2
Mexico:	2,068	1,283	1,263	1,210	1,424	5.0	8.6	8.4	8.8	9.4	11.1	11.1	11.1	11.1	11.1
Guatemala:	24	20	18	23	23	9.2	8.4	8.4	10.4	8.1	10,388	11,081	11,187	11,446	15,778
Europe:															
United Kingdom—	1,746	1,896	1,380	1,846	1,197	33.7	33.9	33.7	35.7	30.0	58,800	47,294	47,451	39,940	35,887
England and Wales:	1,746	1,896	1,380	1,846	1,197	33.7	33.9	33.7	35.7	30.0	58,800	47,294	47,451	39,940	35,887
Scotland:	6	6	6	6	6	30.5	30.6	30.6	42.5	35.8	2,261	2,315	2,142	2,128	1,792
Northern Ireland:	34	31	29	27	21	31.0	30.3	30.3	30.6	34.2	1,181	1,183	1,142	1,092	752
Irish Free State:	27	27	29	27	29	33.3	32.5	32.5	40.8	34.6	1,181	1,183	1,142	1,092	752
Norway:	352	351	374	347	384	23.6	23.7	23.7	25.0	24.0	10,622	10,622	10,622	10,622	10,622
Sweden:	202	202	260	249	259	30.1	28.6	28.6	33.2	33.2	8,973	8,973	8,973	8,973	8,973
Denmark:	147	148	112	143	191	42.6	48.6	48.6	45.3	42.0	8,973	8,973	8,973	8,973	8,973
Netherlands:	889	408	366	411	396	38.9	42.3	42.3	37.1	38.5	18,184	17,215	13,225	13,236	10,265
Belgium:	23	37	21	26	26	17.0	18.3	18.3	18.1	17.7	392	392	392	392	442
Luxemburg:	13,507	12,956	10,622	11,133	12,496	13.6	21.7	21.7	25.3	21.6	280,774	281,285	287,252	281,119	289,632
France:	10,457	10,571	10,622	11,133	12,496	13.6	21.7	21.7	25.3	21.6	143,420	142,940	146,700	146,700	154,427
Spain:	1,078	1,102	1,075	1,120	1,161	10.3	6.8	6.8	10.1	10.4	11,108	7,646	10,814	13,817	12,042
Portugal:	11,587	12,263	11,794	11,917	12,076	17.2	18.6	18.6	22.1	20.5	198,307	228,698	260,126	210,071	247,985
Italy:	3,013	3,134	3,134	3,134	3,134	30.9	33.4	33.4	32.6	32.6	3,457	4,474	4,474	3,601	4,361
Switzerland:	4,606	4,606	4,606	4,606	4,606	27.3	27.3	27.3	31.6	31.6	141,593	141,593	141,593	141,593	141,593
Germany:	1,526	1,518	1,518	1,518	1,518	23.6	23.6	23.6	23.6	23.6	3,457	4,474	4,474	3,601	4,361
Austria:	3,345	3,345	3,345	3,345	3,345	27.3	27.3	27.3	31.6	31.6	141,593	141,593	141,593	141,593	141,593
Czechoslovakia:	2,800	2,800	2,800	2,800	2,800	23.6	23.6	23.6	23.6	23.6	3,457	4,474	4,474	3,601	4,361
Hungary:	2,068	2,068	2,068	2,068	2,068	23.6	23.6	23.6	23.6	23.6	3,457	4,474	4,474	3,601	4,361
Yugoslavia:	2,068	2,068	2,068	2,068	2,068	23.6	23.6	23.6	23.6	23.6	3,457	4,474	4,474	3,601	4,361
Greece:	2,068	2,068	2,068	2,068	2,068	23.6	23.6	23.6	23.6	23.6	3,457	4,474	4,474	3,601	4,361
Bulgaria:	2,068	2,068	2,068	2,068	2,068	23.6	23.6	23.6	23.6	23.6	3,457	4,474	4,474	3,601	4,361
Rumania:	2,068	2,068	2,068	2,068	2,068	23.6	23.6	23.6	23.6	23.6	3,457	4,474	4,474	3,601	4,361
Poland:	2,068	2,068	2,068	2,068	2,068	23.6	23.6	23.6	23.6	23.6	3,457	4,474	4,474	3,601	4,361
Lithuania:	214	214	214	214	214	23.6	23.6	23.6	23.6	23.6	3,457	4,474	4,474	3,601	4,361
Latvia:	89	89	89	89	89	23.6	23.6	23.6	23.6	23.6	3,457	4,474	4,474	3,601	4,361
Estonia:	47	47	47	47	47	23.6	23.6	23.6	23.6	23.6	3,457	4,474	4,474	3,601	4,361

# STATISTICS OF GRAINS

585

Finland.....	36	46	84	51	47	20.5	21.7	22.5	23.7	24.7	730	908	765	1,210	1,161
Russia.....	43,122	71,956	81,000	83,732	92,854	9.8	11.1	8.7	12.9	-----	424,233	705,235	702,851	1,084,000	-----
Estimated European total, excluding Russia.....	66,400	71,400	70,100	73,500	75,300	-----	-----	-----	-----	-----	1,106,000	1,410,000	1,450,000	1,368,000	1,435,000
<b>Africa:</b>															
Morocco.....	2,272	2,665	3,011	2,937	2,732	9.6	9.3	10.5	7.2	12.7	21,758	24,749	31,754	21,302	34,708
Algeria.....	3,406	3,656	3,795	4,027	3,535	7.8	8.3	8.8	8.1	6.4	20,710	30,520	33,307	32,430	20,578
Tunisia.....	1,426	1,520	1,732	1,922	1,927	5.5	6.7	7.1	5.4	7.2	7,822	12,305	12,909	10,398	13,942
Egypt.....	1,462	1,690	1,614	1,522	1,649	25.2	23.5	28.0	20.1	27.9	36,806	37,266	45,228	33,753	46,071
<b>Asia:</b>															
Turkey.....	7,038	7,112	5,947	6,388	-----	15.6	8.3	16.8	13.9	-----	139,510	59,196	99,900	89,033	-----
India.....	29,560	32,193	31,973	31,654	32,181	11.4	9.0	10.0	12.3	10.8	336,269	240,864	320,731	360,843	347,275
Japanese Empire—	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Japan.....	1,197	1,201	1,213	1,204	1,231	22.5	25.7	25.1	24.5	25.1	26,899	30,812	30,496	29,538	30,892
Chosen.....	1,852	896	874	848	817	11.6	9.6	9.5	10.6	10.2	10,263	8,585	8,520	8,965	8,341
Taiwan.....	7	1	1	1	1	9.1	15.0	13.0	13.0	-----	64	15	13	13	-----
Kwantung.....	4	4	3	3	-----	11.8	8.0	11.7	16.3	-----	47	32	35	46	-----
Estimated Asiatic total, excluding Russia and China.....	38,600	43,500	42,000	42,300	42,400	-----	-----	-----	-----	-----	437,000	409,000	491,000	553,000	525,000
Estimated Northern Hemisphere total, ex- cluding Russia and China.....	195,900	208,700	211,000	213,800	210,200	-----	-----	-----	-----	-----	2,908,000	3,419,000	3,194,000	3,317,000	3,287,000
<b>SOUTHERN HEMISPHERE</b>															
Chile.....	1,446	1,715	1,724	1,609	1,517	17.8	17.3	19.4	13.2	-----	25,761	26,079	33,529	21,190	-----
Uruguay.....	867	1,085	1,067	864	1,154	11.2	11.3	12.0	8.4	10.2	9,680	12,304	13,157	7,218	11,769
Argentina.....	16,982	22,428	16,903	19,675	17,285	12.0	15.6	12.0	12.0	12.6	203,388	349,051	162,576	225,960	218,623
Union of South Africa.....	868	825	942	1,137	-----	8.6	8.8	11.8	9.0	-----	7,451	7,238	11,140	10,150	12,188
Southern Rhodesia.....	4	3	5	6	-----	17.8	7.7	8.6	6.7	-----	4	23	43	40	-----
Australia.....	10,010	14,840	14,977	18,213	13,990	12.8	10.8	8.5	11.7	12.2	128,520	159,079	126,865	212,629	170,966
New Zealand.....	224	255	236	221	276	29.6	34.6	30.7	32.0	-----	6,640	8,833	7,240	7,075	-----
Estimated Southern Hemi- sphere total.....	31,000	42,600	40,500	44,200	36,200	-----	-----	-----	-----	-----	390,000	580,000	368,000	504,000	452,000
Estimated world total, ex- cluding Russia and China.....	224,900	251,300	252,100	258,000	246,400	-----	-----	-----	-----	-----	3,298,000	3,999,000	3,562,000	3,831,000	3,749,000

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

<sup>1</sup> Preliminary.

<sup>2</sup> Year 1925.

<sup>3</sup> Area sown.

<sup>4</sup> 2-year average.

TABLE 9.—Wheat: World production, 1890-91 to 1931-32

Crop year	World production excluding Russia and China	Northern Hemisphere production excluding Russia and China	European production excluding Russia	Selected countries						
				Russia <sup>1</sup>	United States	Canada	India	Argentina	Australia	France
	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels
1890-91	1,878	1,802	1,058	212	378	42	229	31	27	330
1891-92	1,989	1,904	900	173	585	42	257	36	26	215
1892-93	2,053	1,938	1,045	255	528	48	227	59	33	311
1893-94	2,076	1,936	1,067	375	428	41	286	82	37	278
1894-95	2,128	2,018	1,080	355	516	43	271	61	28	344
1895-96	2,126	2,039	1,057	310	569	41	261	46	18	340
1896-97	2,057	1,956	1,103	412	544	33	201	32	21	340
1897-98	1,893	1,790	842	340	610	47	200	53	28	242
1898-99	2,552	2,374	1,168	459	772	63	269	105	41	365
1899-1900	2,319	2,150	1,113	454	636	57	255	102	40	365
1900-01	2,210	2,064	1,096	423	603	56	200	75	48	326
1901-02	2,472	2,357	1,103	428	789	85	265	56	39	311
1902-03	2,510	2,368	1,207	607	725	94	227	104	12	328
1903-04	2,651	2,412	1,266	621	664	78	298	130	74	363
1904-05	2,478	2,238	1,116	667	597	69	360	151	55	300
1905-06	2,673	2,441	1,223	636	727	106	283	135	69	335
1906-07	2,960	2,694	1,356	543	757	126	320	156	66	329
1907-08	2,619	2,344	1,176	571	638	93	317	192	45	381
1908-09	2,544	2,283	1,181	628	645	112	229	156	63	317
1909-10	2,819	2,564	1,240	846	700	167	285	131	90	359
1910-11	2,777	2,495	1,201	836	635	132	360	146	95	253
1911-12	3,043	2,758	1,347	563	621	231	376	166	72	322
1912-13	3,093	2,770	1,284	801	730	224	371	187	92	334
1913-14	3,098	2,853	1,301	1,028	763	232	368	105	103	319
1914-15	2,834	2,601	1,072	<sup>2</sup> 834	861	161	312	169	25	283
1915-16	3,497	3,102	1,125	<sup>3</sup> 827	1,026	394	377	169	179	223
1916-17	2,734	2,487	1,049	<sup>4</sup> 631	636	263	323	84	152	205
1917-18	2,674	2,178	740	622	637	234	382	235	115	<sup>5</sup> 135
1918-19	2,911	2,608	909	-----	921	189	370	180	76	229
1919-20	2,821	2,517	899	-----	968	193	280	217	46	187
1920-21	2,948	2,595	949	320	833	263	373	156	146	237
1921-22	3,173	2,791	1,222	205	815	301	250	191	129	323
1922-23	3,223	2,965	1,044	243	868	400	367	196	109	243
1923-24	3,557	3,124	1,257	419	797	474	372	248	125	276
1924-25	3,150	2,739	1,058	472	864	262	361	191	165	281
1925-26	3,388	3,020	1,397	782	677	395	331	191	115	330
1926-27	3,493	3,043	1,216	914	831	407	325	230	161	232
1927-28	3,675	3,202	1,275	785	878	490	335	282	118	276
1928-29	3,999	3,419	1,410	795	915	567	261	349	160	281
1929-30	3,562	3,194	1,450	703	813	305	321	163	127	337
1930-31	3,821	3,317	1,368	1,064	858	421	391	236	213	281
1931-32	3,749	3,297	1,435	-----	892	304	347	219	171	270

Bureau of Agricultural Economics. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

<sup>1</sup> Includes all Russian territory reporting for years named.

<sup>2</sup> Total Russian Empire exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.

<sup>3</sup> Exclusive of Russian Poland, Lithuania, parts of present Latvia and Ukraine, and 2 Provinces of Transcaucasia.

<sup>4</sup> Beginning with this date estimated production is within present boundaries of the Union of Socialist Soviet Republics, excluding Turkestan, Transcaucasia, and the Far East, which regions in 1924 produced 51,706,000 bushels, and in 1925, 58,000,000 bushels.

<sup>5</sup> Beginning with this date production is within postwar boundaries and therefore not comparable with earlier years.

<sup>6</sup> Preliminary.

# STATISTICS OF GRAINS

587

TABLE 10.—Wheat, all: Monthly marketings by farmers, as reported by about 3,500 mills and elevators, United States, 1921-22 to 1930-31

Crop year	Percentage of year's receipts											
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1921-22	19.1	18.2	16.4	10.6	6.8	5.4	4.4	4.9	3.9	3.2	3.5	3.6
1922-23	14.8	17.3	14.2	12.0	8.6	7.4	5.5	5.1	4.3	3.7	3.4	3.7
1923-24	13.4	17.6	16.7	13.7	9.5	6.2	4.6	4.8	3.3	2.9	3.7	3.6
1924-25	13.6	19.8	17.5	14.5	8.6	5.6	5.3	4.2	2.5	1.6	3.1	3.7
1925-26	14.6	18.6	18.7	10.9	8.6	7.0	4.7	4.0	3.0	3.0	2.9	4.0
1926-27	21.8	20.3	13.2	10.0	5.8	5.0	4.6	4.6	3.6	2.4	3.2	5.5
1927-28	15.4	18.6	19.6	12.6	7.7	5.6	4.5	4.1	3.8	2.5	2.5	3.1
1928-29	17.9	13.6	17.0	11.6	7.0	5.4	3.8	4.3	3.4	2.5	2.6	5.9
1929-30	26.7	23.4	13.5	8.1	4.5	4.5	3.0	2.8	2.3	2.4	2.6	6.2
1930-31	24.2	20.7	12.1	6.9	4.0	4.8	4.6	4.8	3.6	3.3	4.0	10.0

Bureau of Agricultural Economics.

TABLE 11.—Wheat, all: Receipts inspected, by markets, 1922-23 to 1930-31

Market	Year beginning July								
	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
Minneapolis	126,508	99,366	76,960	118,730	85,466	129,966	119,605	83,291	97,673
Duluth	71,154	38,460	102,654	67,447	49,985	98,032	89,357	41,822	47,011
Kansas City	77,302	59,948	86,713	51,571	90,535	74,595	101,190	83,123	90,807
Chicago	89,207	43,017	59,831	19,058	30,811	34,592	25,827	28,462	41,821
St. Louis	27,254	26,859	26,909	25,148	26,247	24,423	34,714	27,769	31,943
Omaha	28,760	19,763	31,660	16,903	21,642	30,008	34,689	31,673	46,907
Wichita	21,135	22,151	29,559	18,972	28,166	21,191	30,584	28,985	26,077
Portland, Oreg.	22,395	35,732	21,559	27,892	35,299	42,931	27,612	26,332	28,436
New York	27,368	9,186	21,978	6,334	33,855	45,096	41,102	11,939	6,707
Philadelphia	36,893	6,252	18,236	5,767	6,933	4,026	1,378	1,325	2,081
Baltimore	13,434	16,490	14,286	13,862	21,204	13,904	17,864	8,862	12,182
New Orleans	24,628	6,261	32,630	2,235	8,908	7,622	5,810	10,035	5,260
Galveston	17,400	7,055	33,953	2,769	44,781	11,532	16,372	22,991	20,222
All other inspection points	224,418	213,715	256,192	201,036	308,883	260,728	346,593	368,688	345,972
Total	757,906	605,245	813,120	577,724	792,215	798,466	892,887	775,527	805,304

Bureau of Agricultural Economics. Compiled from reports of licensed inspectors through district offices of Federal grain inspection. The quantity loaded per car varies, but car-lot receipts have been converted to bushels by using a factor of 1,300 bushels to a car.

TABLE 12.—Wheat: Receipts inspected, all inspection points, United States, by months, 1917-18 to 1930-31

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1917-18	13,347	40,988	46,192	61,233	58,479	33,858	21,947	15,012	14,984	13,878	13,494	12,408	345,820
1918-19	66,639	154,683	140,008	107,875	69,210	95,615	45,861	28,526	32,984	23,626	28,809	18,986	809,574
1919-20	90,870	151,674	124,209	89,025	60,875	48,721	42,614	32,181	33,190	29,611	34,638	43,375	785,933
1920-21	65,634	95,897	102,430	86,562	75,903	67,392	64,323	50,272	46,435	59,762	60,271	68,307	853,236
1921-22	137,839	147,696	123,571	87,588	48,424	53,422	44,283	46,340	40,535	25,398	44,347	40,089	941,586
1922-23	87,814	116,431	91,078	77,063	76,625	76,764	62,920	35,993	38,611	34,857	30,698	28,662	757,906
1923-24	80,391	104,682	72,726	65,907	58,718	45,287	30,216	37,436	28,772	21,012	81,078	29,090	805,245
1924-25	91,850	148,100	125,347	129,769	84,376	49,217	37,809	36,642	31,622	15,568	28,179	32,341	815,120
1925-26	70,715	75,485	84,804	49,370	57,282	53,128	32,040	30,202	26,305	25,510	28,206	43,887	577,724
1926-27	158,298	134,553	90,938	67,998	51,876	42,163	42,596	44,334	40,291	35,014	40,579	43,686	732,215
1927-28	103,236	118,828	127,067	104,410	73,841	49,513	43,417	40,328	35,928	31,061	38,214	24,000	798,466
1928-29	145,457	126,043	114,787	117,295	78,382	61,513	41,608	45,636	45,039	31,494	36,538	51,173	882,587
1929-30	209,371	162,871	82,242	57,525	52,495	40,912	28,461	24,631	25,663	22,639	30,615	55,812	775,527
1930-31	194,589	135,477	84,161	45,238	33,914	33,770	47,376	46,201	42,311	32,583	46,533	55,151	805,304

Bureau of Agricultural Economics. Compiled from reports of licensed inspectors through district offices of Federal grain inspection. The quantity loaded per car varies, but car-lot receipts have been converted to bushels by using a factor of 1,300 bushels to a car.

TABLE 13.—Wheat: Receipts inspected, all inspection points, by classes, and grades, 1926-27 to 1930-31

Class, and year beginning July	Grade						Total
	No. 1	No. 2	No. 3	No. 4	No. 5	Sample	
<b>Hard red spring:</b>	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.
1926-27.....	51,160	29,373	23,823	17,677	4,114	10,706	136,853
1927-28.....	106,285	56,839	41,268	18,763	6,200	11,989	241,294
1928-29.....	110,602	36,986	22,562	8,462	4,625	40,812	224,049
1929-30.....	76,072	24,489	13,376	2,759	980	5,602	123,278
1930-31.....	76,942	25,971	27,161	9,455	2,547	932	143,008
<b>Durum:</b>							
1926-27.....	2,405	10,548	6,548	7,764	1,395	4,403	33,063
1927-28.....	11,331	31,170	9,692	5,567	2,147	2,414	62,321
1928-29.....	5,248	33,789	14,652	9,169	5,478	5,508	73,844
1929-30.....	4,340	20,261	4,206	1,894	1,253	880	32,839
1930-31.....	7,496	28,660	4,062	1,464	509	307	42,498
<b>Hard red winter.</b>							
1926-27.....	201,893	145,602	31,067	10,084	7,821	10,978	407,445
1927-28.....	100,264	123,475	41,434	19,331	11,127	14,604	310,295
1928-29.....	141,065	168,205	69,541	28,330	18,914	16,836	442,871
1929-30.....	99,115	202,095	110,726	34,014	11,495	13,022	470,487
1930-31.....	209,130	170,836	45,361	19,505	10,588	7,003	461,921
<b>Soft red winter.</b>							
1926-27.....	35,810	40,147	11,656	7,903	2,881	6,011	104,408
1927-28.....	10,563	25,795	13,659	7,942	2,305	3,371	63,635
1928-29.....	8,317	15,856	7,416	4,924	1,654	3,967	42,134
1929-30.....	4,933	25,808	19,668	4,107	970	1,709	57,190
1930-31.....	35,847	12,637	2,427	610	392	395	52,308
<b>White:</b>							
1926-27.....	10,981	25,696	8,215	1,999	423	659	47,973
1927-28.....	17,822	28,819	8,733	3,072	1,870	3,492	60,308
1928-29.....	17,412	19,433	2,791	650	228	322	40,841
1929-30.....	13,068	22,785	3,867	481	131	346	40,508
1930-31.....	11,786	23,113	5,122	568	130	207	43,926
<b>Mixed:</b>							
1926-27.....	15,877	20,626	10,011	7,340	2,597	6,022	62,473
1927-28.....	14,807	22,624	12,042	5,570	2,453	3,097	60,598
1928-29.....	14,150	23,333	13,111	8,395	5,621	4,533	68,145
1929-30.....	11,187	20,687	11,454	3,914	2,076	1,927	51,243
1930-31.....	22,092	23,589	8,540	4,582	1,790	1,060	61,643
<b>Total:</b>							
1926-27.....	318,126	271,992	91,320	52,767	19,231	38,779	792,215
1927-28.....	261,072	284,722	126,825	60,245	25,002	38,977	798,440
1928-29.....	296,774	297,612	130,073	59,580	36,520	71,978	892,837
1929-30.....	208,745	318,120	153,067	47,169	16,910	23,486	776,527
1930-31.....	363,283	287,806	52,673	36,184	15,964	9,894	806,304

Bureau of Agricultural Economics. Compiled from reports of licensed inspectors through district offices of Federal grain inspection. See 1927 Yearbook, p. 752, for data for earlier years. The quantity loaded per car varies, but car-lot receipts have been converted to bushels by using a factor of 1,300 bushels to a car.

TABLE 14.—Wheat: Visible supply in the United States,<sup>1</sup> 1922-23 to 1931-32

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1922-23.....	20,342	23,077	32,479	33,025	39,023	39,764	43,866	53,525	64,552	61,862	48,521	37,203
1923-24.....	29,403	40,526	63,922	72,930	79,084	82,269	84,080	75,111	72,914	66,789	50,383	45,686
1924-25.....	38,597	46,193	79,700	92,353	100,712	105,997	99,121	94,476	70,487	62,766	49,529	38,328
1925-26.....	29,285	34,041	39,800	53,639	52,394	52,696	50,244	53,790	48,106	35,173	33,795	33,170
1926-27.....	16,486	34,573	72,894	84,724	81,178	78,910	70,811	63,517	61,271	53,827	42,402	31,115
1927-28.....	25,516	37,533	71,908	85,753	98,670	100,018	94,336	83,729	77,949	73,220	66,184	52,460
1928-29.....	42,208	66,762	96,798	113,327	133,008	145,234	145,818	138,739	130,064	123,359	115,559	98,966
1929-30.....	95,684	145,504	196,836	206,773	209,436	198,557	185,171	173,489	165,174	153,178	140,315	123,035
1930-31.....	112,755	163,618	201,541	219,108	211,600	207,479	200,007	202,537	208,102	213,062	206,463	206,196
1931-32.....	202,085	226,544	251,480	245,308	233,284	235,955	.....	.....	.....	.....	.....	.....

Bureau of Agricultural Economics. Compiled from Bradstreet's. Includes grain stored at approximately 50 interior and seaboard points of accumulation and grain in transit by canals and lakes; also Pacific coast stocks at Portland, Tacoma, and Seattle.

<sup>1</sup> Saturday nearest the 1st of each month.

# STATISTICS OF GRAINS

589

TABLE 15.—Wheat: Commercial stocks in store, 1926-27 to 1931-32

## DOMESTIC WHEAT IN UNITED STATES<sup>1</sup>

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1926-27	-----	-----	-----	-----	-----	-----	66,340	56,308	56,262	49,910	37,667	27,833
1927-28	21,052	33,677	62,042	78,811	89,684	91,589	88,381	79,152	72,858	68,791	61,957	48,286
1928-29	38,587	52,421	93,870	115,469	139,493	140,172	144,351	129,646	128,377	124,766	113,392	96,059
1929-30	90,442	136,423	186,847	198,211	202,461	189,926	185,151	163,346	160,674	153,122	135,470	120,303
1930-31	108,327	161,897	201,319	223,826	211,381	206,618	199,649	202,694	208,651	214,342	206,490	209,110
1931-32	208,491	235,727	261,742	256,327	244,043	236,616	-----	-----	-----	-----	-----	-----

## UNITED STATES WHEAT IN CANADA

1926-27	-----	-----	-----	-----	-----	-----	1,067	549	437	378	746	1,344
1927-28	1,362	1,280	4,249	4,560	7,258	5,156	3,933	2,285	1,680	977	883	2,314
1928-29	2,506	2,258	2,546	3,295	8,602	8,280	7,328	3,930	2,139	1,586	1,738	4,885
1929-30	3,332	2,288	4,450	8,770	9,065	9,101	8,546	7,517	6,613	5,980	5,431	4,359
1930-31	4,729	3,961	3,812	4,699	4,756	4,790	4,819	4,802	4,951	4,891	5,897	7,251
1931-32	14,657	22,934	32,236	32,511	31,627	29,414	-----	-----	-----	-----	-----	-----

## CANADIAN WHEAT IN UNITED STATES<sup>2</sup>

1926-27	-----	-----	-----	-----	-----	-----	23,394	14,500	9,532	6,650	10,724	16,749
1927-28	7,472	4,885	3,410	3,784	3,617	31,375	35,764	28,703	19,260	11,848	6,697	11,549
1928-29	11,132	13,608	3,789	7,549	13,291	33,902	40,717	33,327	32,851	23,854	23,772	25,538
1929-30	23,196	23,650	22,025	21,753	23,316	34,527	33,837	35,617	31,616	25,285	17,587	14,372
1930-31	16,435	16,493	12,603	17,304	22,112	30,297	32,266	26,954	18,083	13,990	2,766	5,926
1931-32	5,409	6,244	6,227	9,116	12,596	23,480	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Compiled from weekly reports to the grain, hay, and feed market news service. Data are for stocks on the Saturday nearest the 1st day of the month.

<sup>1</sup> Includes wheat in store in public and private elevators in 42 important markets and also the wheat afloat in vessels or barges in the harbors of lake and seaboard ports. Wheat in transit either by rail or water, mill stocks, or small private stocks of wheat intended only for local purposes, not included.

<sup>2</sup> Includes wheat stored at lake and seaboard ports, exclusive of wheat in transit on lakes and canals.

TABLE 16.—Wheat: Production and farm disposition, price per bushel, farm value, gross income, and cash income, United States, 1924-1930

Year	Production	Used for seed	Fed to live-stock	Loss, waste, and shrinkage	Ground at mills for home use or exchanged for flour	Sold or for sale	Farm price, <sup>1</sup> per bushel	Farm value	Gross income	Cash income
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	Dollars	1,000 dollars	1,000 dollars	1,000 dollars
1924	864,428	80,635	49,649	7,103	9,965	717,076	1.25	1,053,009	907,480	893,408
1925	676,785	78,895	28,919	5,729	9,935	553,287	1.43	972,141	807,709	792,141
1926	331,381	84,062	36,017	6,667	10,185	694,450	1.22	1,014,420	858,977	845,687
1927	378,374	90,383	42,126	6,667	10,080	729,168	1.18	1,045,858	876,891	863,597
1928	914,876	83,582	53,323	6,666	8,425	762,980	.99	914,906	764,880	754,121
1929	809,176	82,384	55,429	6,524	9,215	655,624	1.06	849,541	696,207	685,323
1930 <sup>1</sup>	850,965	77,198	156,972	7,252	9,860	598,683	.86	566,231	401,441	399,224

Bureau of Agricultural Economics. Estimate prepared April, 1931; not revised to December, 1931, revised estimates of production.

<sup>1</sup> Based on monthly prices weighted by estimated monthly marketing by States which differ from weighted prices in Table 21, in which production weights are used.

<sup>2</sup> Preliminary.

TABLE 17.—Wheat, including flour: Supply, distribution, and disappearance in continental United States, averages 1899-1900 to 1925-26, annual 1927-28 to 1931-32

Item	Year beginning July								
	Average 1899- 1900 to 1908-09	Average 1909-10 to 1913-14	Average 1914-15 to 1920-21	Average 1921-22 to 1925-26	1927-28	1928-29	1929-30	1930-31	1931-32
SUPPLY									
Stocks, July 1:	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
On farms <sup>1</sup> .....	46,428	28,872	32,631	37,059	27,222	23,729	45,483	47,417	31,865
In country elevators and mills <sup>1</sup> .....	27,000	29,000	26,997	30,991	21,776	19,277	41,546	60,166	30,552
Commercial stocks <sup>2</sup> .....	31,817	24,168	19,290	25,519	21,052	38,587	90,442	109,327	208,967
In merchant mills and elevators <sup>3</sup> .....					37,038	31,920	48,279	46,670	21,808
In transit to merchant mills <sup>3</sup> .....					11,274	10,893	16,237	14,706	12,198
Stored for others by mer- chant mills <sup>3</sup> .....								12,500	18,413
Total wheat as grain.....	105,240	82,040	78,918	93,569	118,362	124,406	241,987	290,786	318,803
Flour (in terms of wheat) <sup>4</sup> .....	7,709	8,306	8,606	8,676	9,076	9,019	13,541	20,497	6,886
Total wheat and flour.....	112,949	90,346	87,524	102,245	127,438	133,425	255,528	311,283	325,689
New crop <sup>5</sup> .....	877,927	690,108	844,605	804,218	878,374	914,876	812,573	858,160	892,271
Imports (flour included) <sup>6</sup> .....	753	1,834	19,806	17,478	15,734	21,442	12,956	19,059	
Total supply.....	791,629	782,287	951,935	923,936	1,021,546	1,069,743	1,081,057	1,188,502	
DISTRIBUTION									
Exports and shipments:									
Exports (flour included) <sup>3</sup> .....	156,435	107,108	257,030	207,237	206,259	163,687	153,245	131,536	
Reexports (flour in- cluded) <sup>4</sup> .....	399	195	562	221	53	55	72	20	
Shipments (flour included to Alaska, Hawaii, and Porto Rico) <sup>4</sup> .....	2,034	2,549	2,546	2,836	2,690	3,172	2,977	2,850	
Total.....	158,868	109,847	260,138	210,294	209,002	166,914	156,294	134,406	
Seed requirements <sup>6</sup> .....	70,444	72,326	88,312	82,171	90,383	83,582	82,965	77,198	
Disappearance for food, feed, and waste.....	462,221	501,768	514,354	534,040	558,736	563,719	543,015	651,209	
Carry-over, June 30 <sup>7</sup> .....	100,066	98,346	89,131	97,431	133,425	255,528	298,783	325,689	
Total distribution.....	791,629	782,287	951,935	923,936	1,021,546	1,069,743	1,081,057	1,188,502	
Population, Jan. 1 <sup>8</sup> .....	Thou- sands 82,614	Thou- sands 94,378	Thou- sands 102,880	Thou- sands 112,696	Thou- sands 119,029	Thou- sands 120,694	Thou- sands 122,359	Thou- sands 124,000	Thou- sands
Per capita disappearance:	Bush- els	Bush- els	Bush- els	Bush- els	Bush- els	Bush- els	Bush- els	Bush- els	Bush- els
For food, feed, and waste.....	5.595	5.317	5.000	4.739	4.946	4.671	4.438	5.252	
For food, feed, seed, and waste.....	6.448	6.083	5.858	5.468	5.705	5.363	5.116	5.574	

Bureau of Agricultural Economics. Compiled as follows:

<sup>1</sup> Based on returns to the bureau from crop reporters.<sup>2</sup> From Bradstreet's visible supply 1899-1900 to 1925-26. Bureau of Agricultural Economics, 1927-28 to 1931-32.<sup>3</sup> Bureau of the Census figures raised to represent all merchant mills.<sup>4</sup> From Chicago Daily Trade Bulletin.<sup>5</sup> From reports of Foreign and Domestic Commerce of the United States.<sup>6</sup> Amount of seed used per acre from returns to the bureau from inquiries sent to crop reporters.<sup>7</sup> For individual items see above.<sup>8</sup> Bureau of the Census.

## STATISTICS OF GRAINS

591

TABLE 18.—*Wheat: Production, 1923-24 to 1931-32, exports, and weighted average price per bushel of representative grades by classes, 1923-24 to 1930-31*

Year beginning July	Estimated production <sup>1</sup>								
	Hard red spring	Durum	Hard red winter	Soft red winter	White <sup>2</sup>	Mixed <sup>3</sup>	Flour as wheat	Other wheat	Total
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1923-24	126, 876	55, 269	241, 851	271, 631	101, 767	—	—	—	797, 394
1924-25	192, 341	66, 105	364, 662	189, 441	51, 879	—	—	—	864, 428
1925-26	156, 053	65, 008	206, 135	169, 792	79, 777	—	—	—	676, 765
1926-27	121, 078	47, 876	360, 440	228, 886	73, 402	—	—	—	831, 381
1927-28	201, 927	83, 162	317, 042	180, 887	95, 356	—	—	—	873, 374
1928-29	203, 071	102, 286	384, 014	139, 666	85, 940	—	—	—	914, 876
1929-30	144, 821	59, 297	374, 572	163, 407	70, 476	—	—	—	812, 573
1930-31	153, 958	66, 979	388, 974	173, 101	75, 148	—	—	—	858, 180
1931-32	61, 894	22, 873	500, 776	245, 915	60, 813	—	—	—	892, 271
Inspections for export and other exports of domestic wheat and flour <sup>4</sup>									
1923-24	1, 022	4, 908	19, 640	9, 810	18, 653	5, 435	81, 087	19, 325	159, 890
1924-25	16, 760	5, 945	90, 840	6, 944	10, 063	9, 336	65, 313	55, 552	260, 803
1925-26	3, 338	4, 170	7, 358	2, 282	16, 914	5, 944	44, 846	23, 183	108, 035
1926-27	1, 829	611	66, 874	29, 980	26, 615	1, 398	62, 910	28, 943	219, 190
1927-28	5, 209	3, 496	41, 603	9, 915	28, 150	1, 874	60, 260	55, 782	206, 259
1928-29	1, 766	1, 045	30, 660	2, 782	14, 710	1, 473	60, 574	50, 677	163, 687
1929-30	1, 490	380	49, 290	2, 547	17, 527	751	61, 070	20, 210	153, 245
1930-31	462	712	44, 328	2, 495	13, 292	192	55, 259	14, 796	131, 636
Average price per bushel <sup>5</sup>									
	Cents	Cents	Cents	Cents					
1923-24	124	106	105	107	—	—	—	—	—
1924-25	158	156	135	159	—	—	—	—	—
1925-26	165	144	163	169	—	—	—	—	—
1926-27	151	155	135	138	—	—	—	—	—
1927-28	141	132	135	149	—	—	—	—	—
1928-29	126	113	112	139	—	—	—	—	—
1929-30	129	119	120	130	—	—	—	—	—
1930-31	82	78	76	83	—	—	—	—	—

Bureau of Agricultural Economics. Estimated production by classes based on questionnaire surveys of local authorities; supplemented by judgment of cereal specialists. Inspections of United States wheat for export data furnished monthly by Federal grain supervision officers at the export markets. Inspections are made at the ports of export. Export figures from reports of the Bureau of Foreign and Domestic Commerce.

<sup>1</sup> Production estimates are based on the estimate of percentage classification by States as reported for 1920-21, 1923-24, and 1924-25; the percentages for 1921-22 and 1922-23 were interpolated from the 1920-21 and 1923-24 percentages. The estimated production for 1930-31 and 1931-32 is subject to revision.

<sup>2</sup> White wheat in the Pacific Northwest region consists of both spring and winter wheat; no attempt has been made to classify this wheat as other than white wheat, part of which is spring and part winter.

<sup>3</sup> Mixed wheats exported from Atlantic coast ports are estimated as approximately 70 per cent durum and the remainder as hard red spring; that exported from Gulf ports as approximately half and half hard and soft winter; and that exported from Pacific coast ports as approximately 90 per cent white and the remainder as hard and soft red winter wheats.

<sup>4</sup> Designations by classes include all inspections for export. Flour as wheat is as reported by customs offices. "Other wheat" comprises total domestic exports as reported by customs offices minus "inspections for export" and consists principally of exports through Canada from customs districts of Buffalo, Chicago, Duluth-Superior, Ohio, and Wisconsin.

<sup>5</sup> The representative grades and markets selected are No. 1 Dark Northern Spring, Minneapolis; No. 2 amber durum, Minneapolis; No. 2 hard winter, Kansas City; and No. 2 red winter, St. Louis.

TABLE 19.—Wheat including flour, in terms of grain: International trade, average 1925-26 to 1929-30, annual 1927-28 to 1930-31

Country	Year beginning July									
	Average 1925-26 to 1929-30		1927-28		1928-29		1929-30		1930-31 <sup>1</sup>	
	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
<b>PRINCIPAL EXPORT- ING COUNTRIES</b>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>
Canada.....	307,640	796	305,658	476	422,782	1,331	184,213	1,392	267,365	243
United States.....	170,077	15,815	206,269	15,734	163,687	21,442	153,245	12,956	131,536	19,059
Argentina.....	159,377	<sup>2</sup> 10	168,214	2	227,059	-----	161,265	-----	120,510	-----
Australia.....	83,268	3	72,962	1	107,785	4	61,776	3	143,295	-----
Hungary.....	23,539	8	22,135	2	23,658	1	31,415	3	18,425	2
Russia.....	<sup>2</sup> 20,319	0	4,866	0	124	0	0	0	-----	0
Yugoslavia.....	10,822	5	1,024	0	7,919	27	23,593	0	4,430	-----
British India.....	10,080	8,636	15,668	2,310	5,716	27,549	6,798	8,646	10,197	10,618
Rumania.....	6,528	79	8,067	24	<sup>4</sup> 1,583	<sup>4</sup> 0	<sup>4</sup> 2,561	<sup>4</sup> 66	<sup>4</sup> 14,793	-----
Algeria.....	5,162	<sup>2</sup> 2,104	6,351	1,569	5,904	2,080	5,363	-----	-----	-----
Tunis.....	3,518	699	629	1,144	5,431	285	6,120	184	6,286	909
Bulgaria.....	1,869	<sup>1</sup> 1,894	2,125	-----	760	-----	96	1,604	5,041	0
Chile.....	925	456	585	622	757	116	1,063	54	1,193	-----
<b>Total.....</b>	<b>503,124</b>	<b>30,385</b>	<b>814,543</b>	<b>21,884</b>	<b>973,115</b>	<b>53,835</b>	<b>637,508</b>	<b>25,088</b>	<b>723,571</b>	<b>30,831</b>
<b>PRINCIPAL IMPORT- ING COUNTRIES</b>										
United Kingdom.....	11,369	215,665	11,181	222,270	11,158	215,138	10,795	212,698	10,064	230,900
Germany.....	11,527	85,668	6,784	98,557	17,664	86,162	7,203	67,958	825	30,853
Italy.....	2,014	76,212	1,108	87,905	2,184	91,930	3,273	46,700	2,628	86,235
France.....	4,170	46,574	132	53,877	116	50,665	18,055	38,471	22,128	66,943
Belgium.....	2,452	43,482	2,618	44,848	2,542	44,061	2,018	44,641	3,110	48,244
Brazil.....	0	32,839	0	34,653	0	36,244	0	33,889	0	30,708
Netherlands.....	943	30,050	586	31,532	709	29,518	856	30,992	1,428	36,830
China <sup>2</sup> .....	1,862	23,486	1,464	15,464	4,205	20,328	1,865	49,123	59	22,021
Japan.....	5,989	23,168	4,859	21,995	10,768	28,203	5,403	19,156	7,953	25,343
Greece.....	0	20,055	0	19,106	0	22,144	0	21,521	0	24,081
Czechoslovakia.....	418	18,604	41	21,323	56	17,248	1,694	13,980	1,751	17,063
Irish Free State.....	<sup>2</sup> 74	18,502	56	18,691	110	17,853	-----	17,915	-----	18,996
Switzerland.....	0	16,461	0	18,427	0	15,496	1	16,915	4	18,393
Austria.....	116	16,275	165	10,230	59	14,903	132	18,530	267	15,966
Egypt.....	162	10,448	433	6,752	181	12,906	108	11,202	24	9,702
Denmark.....	524	10,102	220	10,701	110	17,149	310	8,080	112	11,523
Sweden.....	2,004	9,092	1,660	10,391	3,076	10,553	2,068	9,355	72	5,509
Norway.....	-----	6,964	-----	6,862	-----	8,538	-----	7,130	-----	8,274
Union of South Africa.....	253	6,317	223	8,215	261	8,148	327	5,036	173	3,631
Cuba.....	0	<sup>3</sup> 5,685	0	5,740	0	5,531	0	-----	0	-----
Finland.....	0	5,390	0	5,499	0	6,095	0	5,622	0	4,578
Spain.....	526	5,189	408	2,220	366	17,244	188	4,959	-----	-----
Poland.....	1,407	4,820	225	7,840	106	8,956	790	4,602	4,286	250
Syria and Lebanon <sup>3</sup> .....	<sup>2</sup> 14	2,710	15	1,853	7	5,358	22	1,304	290	458
Latvia <sup>4</sup> .....	-----	2,027	0	1,507	0	2,861	0	2,520	0	1,044
New Zealand.....	45	1,658	1	1,032	4	792	217	719	1	732
Indo-China <sup>4</sup> .....	0	1,177	0	1,233	0	1,206	0	1,211	0	1,005
Estonia.....	0	1,062	0	1,062	0	1,176	0	1,218	0	880
<b>Total.....</b>	<b>45,869</b>	<b>739,672</b>	<b>32,177</b>	<b>775,785</b>	<b>53,742</b>	<b>791,315</b>	<b>55,325</b>	<b>691,348</b>	<b>55,175</b>	<b>721,121</b>

Bureau of Agricultural Economics, official sources except where otherwise noted.

<sup>1</sup> Preliminary.<sup>2</sup> 3-year average.<sup>3</sup> 4-year average.<sup>4</sup> Monthly Crop Report and Agricultural Statistics.<sup>5</sup> 1 year only.<sup>6</sup> Calendar year.

# STATISTICS OF GRAINS

593

TABLE 20.—Wheat, all: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32

Crop year	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	Weighted average
	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
1922-23	99.8	92.6	89.2	94.1	99.4	103.2	104.6	104.4	106.0	108.4	113.2	100.6	98.0
1923-24	89.6	86.4	91.0	94.2	93.7	94.5	96.7	98.0	98.8	95.8	96.8	93.5	92.4
1924-25	105.8	116.8	114.2	129.7	133.6	141.1	162.1	169.8	164.0	140.5	149.1	152.7	127.8
1925-26	140.2	150.4	144.4	136.4	148.8	153.7	158.1	155.5	116.0	142.2	142.1	138.0	145.9
1926-27	127.7	125.1	117.7	121.4	123.6	122.8	122.2	122.8	120.9	117.2	122.2	130.1	123.8
1927-28	127.3	123.5	119.2	113.7	111.4	113.9	115.2	116.2	121.6	128.2	144.3	132.0	120.5
1928-29	118.1	95.2	94.4	98.7	97.1	98.2	98.3	104.2	104.7	98.8	90.1	86.8	100.1
1929-30	102.4	110.7	112.1	111.5	103.4	108.1	107.5	101.3	91.9	98.4	87.5	87.9	105.1
1930-31	70.6	74.0	70.3	65.6	60.0	61.8	59.1	58.7	58.3	59.2	50.9	51.9	66.4
1931-32	36.3	35.4	35.7	30.1	50.5	44.1							

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices reported on 1st of month and 1st of succeeding month, July, 1922-December, 1923.

TABLE 21.—Wheat: Weighted average price<sup>1</sup> per bushel of reported cash sales at Minneapolis and St. Louis, 1922-23 to 1931-32

Grade, market, and crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Weighted average
No. 1 northern spring, Minneapolis:	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1922-23	149	111	110	115	123	125	123	126	124	130	129	117	120
1923-24	112	118	121	120	114	116	119	121	121	121	122	125	117
1924-25	187	181	180	146	148	166	189	187	171	180	167	164	156
1925-26	169	164	160	149	155	169	173	167	161	164	162	163	161
1926-27	172	149	143	149	146	146	143	142	139	138	147	149	146
1927-28	147	143	134	129	130	132	135	134	139	153	157	143	136
1928-29	138	119	119	116	116	115	121	128	125	120	111	115	118
1929-30	143	135	135	131	128	131	127	125	112	111	107	100	133
1930-31	92	91	87	82	75	77	76	75	76	79	81	74	83
1931-32	61	65	69	71	80	73							
No. 2 red winter, St. Louis:													
1922-23	112	109	114	123	129	136	137	139	136	139	133	123	121
1923-24	97	99	109	116	112	114	116	118	114	113	112	116	107
1924-25	135	133	140	156	163	179	210	202	186	177	186	189	159
1925-26	169	172	171	170	171	184	194	185	170	171	162	147	169
1926-27	142	134	136	140	136	137	138	135	130	129	142	150	138
1927-28	141	142	142	145	141	144	151	156	169	196	196	179	149
1928-29	147	138	145	144	145	139	142	140	135	125	117	121	139
1929-30	139	132	135	132	129	135	134	123	118	117	114	105	130
1930-31	85	89	88	87	83	83	73	79	78	80	79	72	83
1931-32	48	47	47	52	62	57							
No. 2 amber durum, Minneapolis:													
1922-23	122	102	98	101	111	110	108	107	111	117	112	104	107
1923-24	96	96	99	104	103	104	113	115	118	114	115	118	106
1924-25	127	129	129	161	164	176	215	210	202	176	180	162	156
1925-26	164	150	130	129	143	156	157	151	144	149	147	150	144
1926-27	154	153	138	150	161	174	168	160	157	154	158	157	155
1927-28	153	140	128	123	128	133	130	129	133	141	140	131	132
1928-29	123	108	106	112	114	110	127	129	124	118	108	115	113
1929-30	135	127	128	125	119	123	119	111	97	99	97	88	119
1930-31	87	86	79	78	70	74	72	73	72	73	77	64	78
1931-32	61	73	73	79	87	84							

Bureau of Agricultural Economics. Compiled from Minneapolis Daily Market Record and St. Louis Daily Market Reporter.

<sup>1</sup> Average of daily prices weighted by car-lot sales.

TABLE 22.—Wheat: Weighted average price<sup>1</sup> per bushel of reported cash sales of all classes and grades, six markets combined, 1922-23 to 1931-32

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Weighted average
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1922-23.....	116.1	105.9	102.7	108.8	116.3	117.8	115.6	116.1	117.0	122.0	117.9	109.5	112.4
1923-24.....	99.0	101.8	106.8	110.4	105.7	105.0	110.3	111.8	111.6	109.9	110.5	116.6	107.0
1924-25.....	125.7	123.5	128.3	144.8	148.2	163.6	183.8	184.8	172.1	150.8	165.5	161.6	145.3
1925-26.....	155.7	160.5	144.8	143.3	153.5	165.7	170.3	164.8	154.9	156.0	153.8	151.6	155.0
1926-27.....	141.6	135.3	135.6	139.4	137.7	139.5	138.8	136.2	133.6	134.7	145.1	148.6	138.3
1927-28.....	138.7	134.4	128.7	125.1	125.6	128.0	131.0	132.0	136.6	180.7	151.4	141.8	132.9
1928-29.....	126.0	109.4	108.9	107.0	109.1	107.4	113.7	118.1	114.2	109.2	101.1	105.3	110.6
1929-30.....	129.8	126.7	127.4	123.7	121.2	123.5	121.6	115.8	108.9	102.5	100.9	94.1	121.9
1930-31.....	52.6	84.7	79.0	76.0	69.8	72.5	71.4	70.9	71.4	74.5	75.5	66.8	77.1
1931-32.....	46.5	50.6	55.7	58.4	68.7	60.0	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Compiled from daily trade papers of markets named. The markets are Chicago, Minneapolis, Kansas City, St. Louis, Omaha, and Duluth.

<sup>1</sup>Average of daily prices weighted by car-lot sales. The prices in this table are comparable with prices paid to producers, in that the latter are averages of the several prices reported which cover all classes and grades sold by producers.

TABLE 23.—Wheat, No. 2 hard winter: Weighted average price<sup>1</sup> per bushel of reported cash sales at Kansas City, 1899-1900 to 1931-32

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Weighted average
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1899-1900.....	66	65	65	65	63	64	63	64	64	64	62	66	65
1900-01 <sup>2</sup> .....	69	66	67	68	67	66	68	68	69	70	70	67	68
1901-02 <sup>2</sup> .....	63	67	66	66	69	75	79	75	72	72	74	70	68
1902-03.....	70	66	67	67	67	67	67	68	68	65	69	73	68
1903-04.....	70	73	73	73	72	71	75	87	89	89	92	89	77
1904-05.....	87	94	103	106	105	105	107	109	104	93	101	100	97
1905-06.....	84	80	78	80	81	81	81	78	76	79	80	78	80
1906-07.....	71	68	66	69	69	70	71	72	71	73	90	91	72
1907-08.....	87	86	93	100	96	97	100	95	98	97	100	97	93
1908-09.....	97	95	98	99	102	103	106	110	115	130	138	137	99
1909-10.....	114	102	102	106	104	110	111	111	110	108	107	108	107
1910-11.....	104	100	99	95	91	93	95	90	88	88	90	88	98
1911-12.....	87	93	95	104	100	100	105	103	105	109	111	109	97
1912-13.....	92	89	88	88	83	84	87	86	86	88	87	88	88
1913-14.....	82	83	87	84	83	84	85	86	88	87	90	85	84
1914-15.....	78	91	104	102	108	113	134	154	149	154	150	121	105
1915-16.....	136	126	107	107	108	112	130	120	105	112	110	100	119
1916-17.....	114	141	157	167	185	173	189	182	197	243	301	274	171
1917-18.....	268	261	212	212	212	212	212	212	212	212	212	212	219
1918-19.....	220	216	216	216	215	224	231	226	239	262	260	247	242
1919-20.....	225	218	224	230	246	263	262	242	249	275	293	276	183
1920-21.....	268	245	244	207	176	169	172	162	155	133	147	138	120
1921-22.....	118	115	123	110	109	109	113	129	134	135	134	117	113
1922-23.....	113	104	104	118	117	117	114	115	116	120	116	104	113
1923-24.....	96	101	109	112	109	109	113	111	109	104	106	108	105
1924-25.....	120	119	120	137	143	162	162	161	171	151	163	160	135
1925-26.....	154	164	158	158	163	172	178	171	161	159	155	153	168
1926-27.....	137	131	132	139	137	138	137	135	133	131	142	144	135
1927-28.....	136	135	131	128	131	132	133	133	138	152	160	147	135
1928-29.....	120	106	107	110	112	111	114	118	116	110	101	105	112
1929-30.....	125	123	124	122	119	121	119	113	102	101	99	89	120
1930-31.....	80	81	78	74	69	71	69	69	70	93	73	68	76
1931-32.....	44	43	43	45	59	52	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Compiled from Kansas City Grain Market Review, formerly Daily Price Current.

<sup>1</sup>Average of daily prices weighted by car-lot sales.

<sup>2</sup>Calendar year 1901, compiled from Kansas City Daily Star.

# STATISTICS OF GRAINS

595

TABLE 24.—Wheat, No. 3 Manitoba Northern: Average cash price per bushel at Winnipeg, in terms of United States money, 1921-22 to 1931-32 <sup>1</sup>

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1921-22	156	150	125	100	93	94	95	118	124	126	130	117	119
1922-23	120	107	95	96	105	104	103	105	105	113	111	108	106
1923-24	99	103	96	89	87	83	86	90	88	89	92	105	92
1924-25	126	134	136	150	153	161	184	187	167	149	174	162	157
1925-26	153	160	132	120	136	149	146	144	138	146	144	144	143
1926-27	149	138	133	136	131	123	123	127	130	133	146	149	135
1927-28	153	145	131	127	124	124	123	124	131	141	142	130	133
1928-29	120	108	106	111	111	109	112	120	119	115	107	112	113
1929-30	152	152	144	134	128	130	123	110	100	103	104	98	123
1930-31	90	88	74	68	60	48	47	53	50	54	53	53	62
1931-32	49	46	43	45	52	43							

Bureau of Agricultural Economics. Compiled as follows: July, 1921-July, 1923, Reports on the Grain Trade of Canada; August, 1923, to latest date shown, Minneapolis Daily Market Record. Conversions at current rate of exchange July, 1921-March, 1925, and September, 1931, to end of table; per rate used April, 1925-August, 1931. Rates are monthly averages as reported by the Federal Reserve Board.

<sup>1</sup> Average of daily cash closing prices, basis, in store at Fort William and Port Arthur.

TABLE 25.—Wheat: Average spot price per bushel of imported wheat at Liverpool, 1914-15 to 1931-32

## IMPORTED RED

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1914-15	105	128	129	128	138	147	167	195	191	194	198	185	157
1915-16	163	161	167	171	159	173	194	190	200	193	171	155	175
1916-17	158	196	200	215	222	239	239	243	242	246	246	246	224
1917-18	250	250	238	226	226	226	232	232	239	232	232	232	235
1918-19	232	232	232	239	246	246	246	246	243	241	241	239	240
1919-20	229	221	216	216	211	195	190	175	211	237	234	240	215
1920-21	234	220	213	234	253	230	233	214	213	213	217	<sup>1</sup> 196	223
1921-22	<sup>1</sup> 171	<sup>1</sup> 159	<sup>1</sup> 156	<sup>1</sup> 131	<sup>1</sup> 126	<sup>1</sup> 137	144	166	162	168	160	143	151
1922-23	152	137	132	148	148	148	148	143	140	145	149	138	144
1923-24	138	132	125	126	126	126	126	(7)	128	128	125	126	---
1924-25	143	160	163	176	179	189	210	214	198	175	184	182	181
1925-26	176	188	180	166	171	189	183	181	164	167	173	172	176

## PARCELS

1925-26	169	173	160	149	165	185	181	175	161	171	173	169	169
1926-27	167	162	160	171	171	163	160	167	155	156	165	165	163
1927-28	161	160	151	149	147	148	149	146	151	159	155	147	152
1928-29	141	126	126	129	129	126	131	135	131	125	116	117	125
1929-30	141	142	137	136	125	141	140	124	119	120	114	110	129
1930-31	106	105	92	86	81	74	68	70	67	71	72	67	80
1931-32	62	53	53	59	64	57							

Bureau of Agricultural Economics. Price per bushel of 60 pounds, good average imported red, July, 1914-June, 1926, compiled from Broomhall's 1921, 1925, and 1927 Corn Trade Yearbooks. Parcels price per bushel of 60 pounds July, 1925, to date, compiled from Broomhall's Corn Trade News. These prices are simple averages of daily sales prices of parcels at Liverpool. Conversions at par from January, 1926, to August, 1931, inclusive. Prior to January 1926, and beginning with September, 1931, conversions were made at monthly average of current rates of exchange as given in Federal Reserve Bulletins.

<sup>1</sup> No. 2 hard winter when available, otherwise No. 2 red winter.

<sup>2</sup> No quotations.

TABLE 26.—*Flour, wheat, spring patents: Average wholesale price per barrel,<sup>1</sup> Minneapolis, 1922-23 to 1931-32*

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1922-23	7.95	7.22	6.68	6.76	6.88	6.86	6.71	6.72	6.72	7.00	6.80	6.85	6.89
1923-24	6.21	6.37	6.45	6.43	6.21	6.30	6.44	6.51	6.49	6.56	6.83	7.12	6.49
1924-25	7.72	7.69	7.52	8.19	8.22	9.03	9.80	10.02	9.34	8.54	9.12	8.88	8.67
1925-26	6.76	9.04	8.52	8.52	8.31	9.52	9.85	9.46	9.19	9.20	9.00	9.32	9.10
1926-27	9.27	8.50	7.87	8.08	7.85	8.02	7.95	7.55	7.74	7.75	8.23	8.39	8.12
1927-28	8.26	7.98	7.52	7.43	7.38	7.37	7.48	7.47	7.88	8.48	8.68	8.36	7.86
1928-29	7.92	7.20	7.16	6.89	6.79	6.64	6.84	7.27	7.29	7.22	6.82	6.94	7.08
1929-30	8.57	8.10	7.94	7.53	7.44	7.69	7.44	7.06	6.86	6.81	6.58	6.47	7.37
1930-31	6.12	5.94	5.67	5.51	5.18	5.30	5.37	5.40	5.21	5.25	5.41	5.16	5.46
1931-32	4.76	4.72	4.81	4.90	5.28	5.08	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Compiled from the Minneapolis Daily Market Record. Prices 1909-1921, appear in 1930 yearbook, Table 25.

<sup>1</sup> Packed in 95-pound cotton sacks.

TABLE 27.—*Bread: Average retail price per pound (baked weight) in leading cities of the United States, 1922-23 to 1931-32*

Year	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	Average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1922-23	8.8	8.7	8.7	8.7	8.7	8.6	8.7	8.7	8.7	8.7	8.7	8.7	8.7
1923-24	8.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7
1924-25	8.7	8.8	8.8	8.8	8.9	8.9	9.2	9.5	9.4	9.4	9.4	9.4	9.1
1925-26	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
1926-27	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
1927-28	9.3	9.3	9.3	9.3	9.3	9.2	9.2	9.2	9.1	9.1	9.1	9.2	9.2
1928-29	9.2	9.2	9.1	9.1	9.1	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.1
1929-30	9.0	9.0	9.0	8.9	8.9	8.9	8.9	8.8	8.8	8.8	8.8	8.8	8.9
1930-31	8.8	8.7	8.7	8.6	8.5	8.5	8.2	8.0	7.9	7.7	7.7	7.6	8.2
1931-32	7.5	7.4	7.3	7.3	7.3	7.2	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Compiled from Bureau of Labor Statistics retail prices, monthly Data for 1913-14 to 1921-22 are available in the 1930 Yearbook, p. 615, Table 26.

TABLE 28.—*Bran, standard: Average wholesale price per ton in 100-pound sacks, Minneapolis, 1922-23 to 1931-32*

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1922-23	15.31	14.06	16.88	21.81	22.65	24.09	25.99	27.84	28.22	27.74	26.75	20.53	22.64
1923-24	19.84	23.62	27.79	28.07	25.65	24.77	24.98	23.66	22.00	20.84	17.66	19.12	23.17
1924-25	22.27	23.48	23.00	24.66	25.62	30.43	30.14	24.49	23.45	23.46	26.84	26.34	25.34
1925-26	23.58	24.30	23.09	22.88	25.73	26.34	26.17	23.68	22.24	25.05	23.30	21.31	23.96
1926-27	22.02	21.69	21.64	21.33	23.14	26.02	26.48	27.64	26.96	27.31	28.43	26.51	24.93
1927-28	25.13	26.85	25.88	25.96	28.41	30.09	30.66	32.47	35.68	34.28	35.03	29.68	30.01
1928-29	27.29	24.12	25.49	28.09	30.82	31.69	30.54	28.64	26.88	22.98	22.38	22.50	26.79
1929-30	26.17	26.44	29.19	28.21	27.90	27.66	26.58	24.45	23.17	27.43	25.06	21.25	26.13
1930-31	19.33	24.17	21.43	19.91	17.97	16.57	16.51	14.66	17.87	19.02	14.15	11.38	17.67
1931-32	10.30	10.55	10.02	9.93	14.17	13.04	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Compiled from the Minneapolis Daily Market Record. Prices are simple averages of daily quotations.

# STATISTICS OF GRAINS

597

TABLE 29.—*Middlings, standard: Average wholesale price per ton, in 100-pound sacks, Minneapolis, 1922-23 to 1931-32*

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Doll's.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1922-23	17.30	16.24	18.03	13.06	23.23	23.73	25.81	27.26	28.11	27.79	25.85	25.69	23.76
1923-24	24.83	25.89	27.85	27.78	25.13	23.80	25.43	23.95	21.65	20.96	18.00	19.92	23.78
1924-25	24.46	25.68	25.27	26.64	27.99	31.44	33.08	26.09	23.62	24.28	29.07	29.68	27.28
1925-26	25.53	26.95	26.37	24.19	26.31	25.28	26.10	23.71	22.08	24.20	21.77	21.60	24.50
1926-27	22.96	23.01	22.67	22.31	24.16	27.38	27.35	28.61	28.46	27.79	29.13	29.10	26.06
1927-28	31.42	34.46	29.22	26.88	28.72	30.00	30.52	32.71	35.85	34.33	37.14	35.30	32.21
1928-29	32.18	24.31	27.44	28.61	31.01	31.21	30.46	28.31	26.28	22.76	21.08	22.64	27.27
1929-30	28.42	29.25	32.66	32.08	28.76	28.00	26.46	24.11	22.71	26.74	25.21	22.09	27.21
1930-31	20.64	25.10	22.17	19.55	17.49	16.00	14.85	13.52	17.36	18.52	13.85	11.95	17.58
1931-32	11.06	10.35	10.35	10.02	14.40	13.08							

Bureau of Agricultural Economics. Compiled from the Minneapolis Daily Market Record. Prices are simple averages of daily quotations.

TABLE 30.—*Wheat: Volume of trading in futures, all contract markets, by months, 1923-24 to 1930-31*

Months	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31
	<i>Million bushels</i>	<i>Million bushels</i>	<i>Million bushels</i>	<i>Million bushels</i>	<i>Million bushels</i>	<i>Million bushels</i>	<i>Million bushels</i>	<i>Million bushels</i>
July	800	1,333	1,460	1,438	1,018	996	2,889	1,806
August	784	1,300	1,561	1,226	1,144	1,133	2,265	1,531
September	678	1,068	1,475	1,156	923	818	1,401	1,216
October	785	1,596	1,573	1,090	918	916	1,738	1,160
November	677	1,340	1,500	1,227	838	750	1,805	1,094
December	528	1,523	2,349	972	543	517	1,608	529
January	373	1,908	1,456	704	384	1,085	1,334	347
February	417	1,781	1,284	531	508	892	1,494	369
March	594	2,273	1,864	920	923	1,083	1,201	433
April	451	1,482	1,397	846	1,590	1,361	1,501	706
May	374	1,508	1,222	1,260	1,471	1,253	1,004	635
June	850	1,759	1,204	1,164	941	1,391	1,377	737
Total	7,317	18,876	18,345	12,584	11,201	12,195	19,607	10,063

Grain futures administration.

TABLE 31.—*Wheat: Volume of trading in futures, contract markets, by markets and by months, 1930-31*

Month	Chicago Board of Trade	Chicago Open Board	Minneapolis	Kansas City	Duluth	St. Louis	Milwaukee	Seattle	Portland	Omaha	New York
	<i>Million bushels</i>	<i>Million bushels</i>	<i>Million bushels</i>	<i>Million bushels</i>	<i>Million bushels</i>	<i>Million bushels</i>	<i>Million bushels</i>	<i>Million bushels</i>	<i>Million bushels</i>	<i>Million bushels</i>	<i>Million bushels</i>
July	1,129	32	50	79	12	1	2	1	1	(1)	(1)
August	1,264	35	104	82	40	1	2	1	2		
September	1,012	32	74	58	35	1	2	1	1		
October	967	34	74	54	27	2	1	1	1		
November	888	24	82	66	28	2	2	1	1		
December	419	9	45	30	15	1	1	1	1		
January	289	12	18	13	10	1	1	1	2	1	
February	320	13	14	12	6		1	1	1	1	
March	365	16	16	15	6		1	1	1	3	8
April	559	31	47	36	20	2	1	1	1	1	8
May	535	29	18	24	9	1	1	2	2	9	6
June	613	30	39	38	12	1	1		1		3
Total	8,360	297	581	516	220	9	15	12	13	15	25

Grain Futures Administration.

\* Trading in Omaha started in June. Less than 100,000 bushels previous to January.

\* Trading in New York started in March.

TABLE 32.—Wheat: Amount of open commitments in the various futures on the Chicago Board of Trade, semimonthly, June 30, 1930—June 30, 1931

Date	Future						
	July	September	December	March	May	June	All futures
	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels
<b>1930</b>							
June 30.....	14	56	35				105
July 15.....	4	61	44				110
July 31.....		66	57	3			126
Aug. 15.....		41	86	7	9		143
Aug. 29.....		14	98	9	21		142
Sept. 15.....		3	109	12	39		162
Sept. 30.....			99	14	54		167
Oct. 15.....	2		93	15	64		174
Oct. 31.....	2		89	17	77		185
Nov. 15.....	4		67	18	95		184
Nov. 29.....	10		29	18	104		161
Dec. 15.....	17		5	16	117		155
Dec. 31.....	27			11	106		145
<b>1931</b>							
Jan. 15.....	28			9	95		132
Jan. 31.....	30			10	94		134
Feb. 14.....	28	4		9	91		133
Feb. 28.....	32	7		10	86		135
Mar. 16.....	34	10		4	82		130
Mar. 31.....	37	14			76	1	127
Apr. 15.....	35	16	3		71	1	126
Apr. 30.....	35	21	7		51	1	115
May 15.....	33	22	8		28	1	93
May 29.....	32	26	12			1	70
June 15.....	31	30	16			1	78
June 30.....	18	40	21				79

Grain Futures Administration.

TABLE 33.—Wheat: Volume of trading in futures on the Chicago Board of Trade, by crop years, 1921-22 to 1930-31

Crop year	Quantity	Crop year	Quantity	Crop year	Quantity
	Bushels		Bushels		Bushels
1921-22.....	12,814,000,000	1925-26.....	15,869,000,000	1929-30.....	18,599,000,000
1922-23.....	9,625,000,000	1926-27.....	10,619,000,000	1930-31.....	8,360,000,000
1923-24.....	6,124,000,000	1927-28.....	9,203,000,000		
1924-25.....	16,587,000,000	1928-29.....	9,908,000,000		

Grain Futures Administration.

TABLE 34.—*Rye: Acreage, production, value, exports, etc., United States, 1909-1931*

Year	Acreage harvested	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value, basis Dec. 1 farm price	Price per bushel of No. 2 rye at Minneapolis year beginning July <sup>1</sup>	Foreign trade, including flour, year beginning July <sup>2</sup>			
							Domestic exports	Imports	Net exports <sup>3</sup>	
									Total	Percentage of production
	1,000 acres	Bushels of 56 lbs.	1,000 bushels	Cents	1,000 dollars	Cents	1,000 bushels	1,000 bushels	1,000 bushels	Per cent
1909.....	2, 196	15. 4	29, 580							
1909.....	2, 196	16. 1	35, 406	72. 2	25, 548	70	242	30	212	0. 6
1910.....	2, 185	16. 0	34, 897	71. 5	24, 953	77	40	227	4 187	. 5
1911.....	2, 127	15. 6	33, 119	88. 2	27, 557	86	31	134	4 103	. 3
1912.....	2, 117	16. 3	35, 664	66. 3	23, 636	60	1, 855	1	1, 854	5. 2
1913.....	2, 557	16. 2	41, 381	63. 4	26, 220	58	2, 273	37	2, 236	5. 4
1914.....	2, 541	16. 8	42, 779	86. 5	37, 018	98	13, 027	147	12, 880	30. 1
1915.....	3, 129	17. 3	54, 050	83. 4	45, 083	94	15, 250	566	14, 684	27. 2
1916.....	3, 213	15. 2	48, 863	122. 1	59, 676	135	13, 703	428	13, 275	27. 2
1917.....	4, 317	14. 6	62, 933	166. 0	104, 447	193	17, 186	834	16, 352	26. 0
1918.....	6, 391	14. 2	91, 041	151. 6	138, 038	158	36, 467	638	35, 829	39. 4
1919.....	7, 679	9. 9	75, 998							
1919.....	7, 129	10. 6	75, 306	133. 1	100, 206	160	41, 531	1, 077	40, 454	53. 7
1920.....	4, 799	13. 0	62, 342	125. 6	78, 329	161	47, 337	452	46, 885	75. 2
1921.....	4, 824	12. 7	61, 070	68. 2	41, 644	92	29, 944	700	29, 244	47. 9
1922.....	6, 757	15. 5	104, 700	67. 6	70, 777	75	51, 663	99	51, 564	49. 2
1923.....	4, 858	11. 1	53, 870	61. 9	33, 335	65	19, 902	2	19, 900	39. 9
1924.....	3, 744	14. 9	55, 674							
1924.....	3, 898	14. 9	57, 672	106. 3	61, 282	114	50, 242	1	50, 241	87. 1
1925.....	3, 717	10. 9	40, 451	76. 5	30, 961	88	12, 647		12, 646	31. 3
1926.....	3, 550	9. 8	32, 894	81. 9	26, 937	98	21, 698	1	21, 697	66. 0
1927.....	3, 390	15. 3	51, 940	84. 3	43, 687	104	26, 346	2	26, 345	50. 8
1928.....	3, 232	11. 0	37, 556	84. 4	31, 687	95	9, 483	1	9, 482	25. 3
1929.....	3, 054	11. 4	34, 950	84. 9	29, 686	90	2, 600	1	2, 599	7. 4
1930.....	3, 543	12. 8	45, 379	88. 4	17, 419	51	227	88	139	. 3
1931 <sup>4</sup> .....	3, 143	10. 4	32, 746	88. 7	12, 673					

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board, revised 1919 to 1928. See introductory text; italic figures are census returns. See 1927 Yearbook, page 764, for data for earlier years.

<sup>1</sup> Prices are from Minneapolis Daily Market Record and are averages of daily prices weighted by car-load.

<sup>2</sup> Compiled from Commerce and Navigation of the United States, 1909-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1926; January and June issues, 1927-1931, and official records of the Bureau of Foreign and Domestic Commerce. Rye—General imports, 1909; imports for consumption, 1910-1931. Rye flour—Imports for consumption, 1909-1931. Rye flour converted to rye on the basis that 1 barrel of rye flour is the product of 6 bushels of grain.

<sup>3</sup> Total exports (domestic plus foreign) minus total imports.

<sup>4</sup> Net imports.

<sup>5</sup> Preliminary.

TABLE 35.—*Rye: Acreage harvested and production, by States, average 1924-1928, annual 1928-1931*

State and division	Acreage harvested					Production				
	Average, 1924- 1928	1928	1929	1930	1931 <sup>1</sup>	Average, 1924- 1928	1928	1929	1930	1931 <sup>1</sup>
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
New York.....	29	20	20	24	20	407	270	300	384	340
New Jersey.....	37	28	31	28	21	624	462	527	504	357
Pennsylvania.....	103	103	127	127	135	1,392	1,288	1,651	1,842	2,025
North Atlantic.....	168	151	178	179	176	2,422	2,020	2,478	2,730	2,722
Ohio.....	42	26	50	42	74	556	273	630	504	1,332
Indiana.....	111	72	100	87	126	1,341	720	1,120	1,088	1,827
Illinois.....	60	46	48	58	64	873	667	696	870	992
Michigan.....	135	167	147	140	158	2,501	2,171	1,632	1,820	2,133
Wisconsin.....	250	167	188	194	175	3,065	1,754	2,266	2,425	2,188
Minnesota.....	465	421	412	424	365	7,078	5,684	6,633	6,869	5,475
Iowa.....	39	49	45	45	41	619	760	698	720	615
Missouri.....	16	15	15	14	28	147	135	112	140	336
North Dakota.....	1,333	1,268	986	1,223	819	16,277	14,278	9,367	14,064	4,914
South Dakota.....	169	168	230	414	373	2,049	1,646	2,714	6,293	2,723
Nebraska.....	210	230	244	317	333	2,448	2,875	2,928	4,121	2,997
Kansas.....	32	20	14	18	25	362	310	147	189	300
North Central.....	2,912	2,679	2,479	2,976	2,581	37,314	31,273	28,933	39,103	25,832
Delaware.....	4	4	5	5	7	54	58	72	70	122
Maryland.....	16	16	19	19	21	226	192	238	285	378
Virginia.....	34	33	42	40	70	377	396	437	460	1,141
West Virginia.....	12	10	11	11	16	126	115	106	126	259
North Carolina.....	58	51	54	49	64	442	382	432	392	576
South Carolina.....	8	8	7	7	8	71	68	63	56	76
Georgia.....	17	16	12	10	13	108	104	72	65	110
South Atlantic.....	148	138	150	141	199	1,405	1,315	1,420	1,454	2,662
Kentucky.....	16	9	18	14	24	200	104	171	147	360
Tennessee.....	16	13	16	14	22	117	82	104	98	178
Oklahoma.....	17	9	8	7	9	147	72	71	70	117
Texas.....	4	3	3	2	3	41	34	42	20	46
South Central.....	53	34	45	37	58	505	292	388	335	699
Montana.....	65	90	67	68	20	888	1,215	502	442	100
Idaho.....	8	4	4	4	3	41	58	44	48	30
Wyoming.....	45	34	32	30	25	353	272	294	255	112
Colorado.....	78	60	64	74	53	675	552	512	629	371
Utah.....	4	3	3	3	3	32	24	25	27	15
Washington.....	19	20	12	9	10	238	250	84	81	75
Oregon.....	14	19	20	22	15	206	235	270	275	128
Western.....	228	230	202	210	129	2,433	2,656	1,731	1,757	831
United States.....	3,509	3,232	3,054	3,543	3,143	44,081	37,556	34,950	45,379	32,746

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

<sup>1</sup> Preliminary.

## STATISTICS OF GRAINS

601

TABLE 36.—Rye: Yield per acre, average 1919-1928, annual 1926-1931, and estimated price per bushel December 1, average 1925-1929, and annual 1926-1931, by States

State and division	Yield per acre							Estimated price per bushel Dec. 1						
	Av., 1919- 1928	1926	1927	1928	1929	1930	1931	Av., 1925- 1929	1926	1927	1928	1929	1930	1931
	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
New York.....	14.2	12.5	15.0	13.5	15.0	16.0	17.0	106	100	105	112	114	74	53
New Jersey.....	16.4	17.5	18.0	16.5	17.0	18.0	17.0	98	95	97	104	103	70	53
Pennsylvania.....	13.6	13.5	13.5	12.5	13.0	14.5	15.0	104	97	105	107	106	79	51
North Atlantic.....	14.3	14.2	14.7	13.4	13.9	15.3	15.5	102.8	96.9	102.9	106.9	106.3	76.6	51.5
Ohio.....	12.7	15.0	13.5	10.5	12.6	12.0	18.0	94	88	92	103	98	67	39
Indiana.....	12.2	13.5	12.5	10.0	11.2	12.5	14.5	88	85	88	94	90	55	34
Illinois.....	15.2	15.0	14.5	14.5	14.5	15.0	15.5	90	86	92	92	89	33	38
Michigan.....	13.3	13.0	14.5	13.0	11.1	13.0	13.5	85	78	89	93	88	55	38
Wisconsin.....	12.4	11.5	12.7	10.5	12.0	12.5	12.5	86	84	90	90	89	45	44
Minnesota.....	15.8	10.0	19.5	13.5	16.1	16.2	15.0	80	76	85	85	82	31	35
Iowa.....	16.0	17.0	15.0	15.5	15.5	16.0	15.0	84	82	86	86	85	48	40
Missouri.....	9.3	10.0	8.0	9.0	7.5	10.0	12.0	111	113	110	108	107	77	43
North Dakota.....	11.3	7.6	16.7	11.0	9.5	11.5	6.0	74	73	80	78	76	24	28
South Dakota.....	12.8	6.2	13.5	9.8	11.8	15.2	7.3	75	73	79	79	76	26	33
Nebraska.....	11.2	9.0	13.0	12.5	12.0	13.0	9.0	75	76	77	77	76	36	35
Kansas.....	11.0	11.7	11.0	15.5	10.5	10.5	12.0	90	94	92	82	85	58	33
North Central.....	12.8	9.5	16.0	11.7	11.7	13.1	10.0	78.8	77.8	82.4	81.3	80.8	32.5	34.7
Delaware.....	13.4	15.0	15.0	14.5	14.5	14.0	17.5	116	110	115	120	115	90	51
Maryland.....	13.0	15.0	12.5	12.0	12.5	15.0	18.0	111	105	110	115	110	87	50
Virginia.....	10.4	12.0	10.5	12.0	10.4	11.5	16.3	119	112	115	120	120	115	55
West Virginia.....	10.5	11.0	11.0	11.5	9.6	11.5	16.2	114	110	110	115	116	96	52
North Carolina.....	7.0	8.0	8.0	7.5	8.0	8.0	9.0	140	135	135	145	140	123	71
South Carolina.....	8.1	10.0	10.0	8.5	9.0	8.0	9.5	187	175	173	183	190	168	92
Georgia.....	6.2	7.5	6.5	6.5	6.0	6.5	8.5	174	160	165	175	189	161	97
South Atlantic.....	8.9	10.0	9.4	9.5	9.5	10.3	13.4	131.6	121.9	128.8	133.8	130.5	112.9	60.1
Kentucky.....	11.2	14.5	10.5	11.5	9.5	10.5	15.0	121	108	120	132	122	96	53
Tennessee.....	6.8	9.6	8.6	6.3	6.5	7.0	8.0	130	120	129	138	133	108	65
Oklahoma.....	8.5	11.0	8.5	8.0	8.9	10.0	13.0	96	90	96	92	90	68	40
Texas.....	10.0	15.5	7.0	11.5	14.0	10.0	15.5	101	97	95	103	92	66	41
South Central.....	9.0	12.2	8.1	8.6	8.6	9.1	12.1	114.1	105.4	116.0	120.2	116.0	91.9	53.1
Montana.....	11.7	12.0	17.0	13.5	7.5	6.5	5.0	73	75	73	69	72	25	35
Idaho.....	12.6	12.5	11.0	14.5	11.0	12.0	10.0	77	73	75	72	85	50	45
Wyoming.....	8.2	8.0	7.5	8.0	9.2	8.5	4.5	68	67	69	72	68	33	40
Colorado.....	9.3	9.0	9.5	9.2	8.0	8.5	7.0	70	71	70	70	71	37	31
Utah.....	9.2	10.5	9.0	8.0	8.4	9.0	5.0	88	80	82	87	91	60	62
Washington.....	11.7	12.0	16.0	12.5	7.0	9.0	7.5	100	100	90	90	95	60	55
Oregon.....	13.1	13.0	16.0	15.0	13.5	12.5	8.5	104	98	95	102	115	60	63
Western.....	10.4	10.2	12.7	11.5	8.6	8.4	6.4	75.9	76.8	76.1	75.3	73.4	38.8	40.9
United States.....*	12.5	9.8	15.3	11.6	11.4	12.8	10.4	82.4	81.9	84.3	84.4	84.9	38.4	38.7

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See Introductory text.

TABLE 37.—Rye: Acreage, yield per acre, and production in specified countries, average 1921-22 to 1925-26, annual 1928-29 to 1931-32

Country	Acreage				Yield per acre				Production			
	Average 1921-22 to 1925-26	1928-29	1930-31	1931-32	Average 1921-22 to 1925-26	1928-29	1930-31	1931-32	Average 1921-22 to 1925-26	1928-29	1930-31	1931-32
NORTHERN HEMISPHERE												
North America:												
Canada	1,386	840	992	1,448	14.4	17.4	13.3	6.8	19,994	13,160	1,000 bushels	1,000 bushels
United States	4,900	3,480	3,054	3,543	13.9	12.5	11.4	10.4	68,018	34,950	45,379	32,746
Total	6,286	4,320	4,046	4,991	14.0	13.4	11.9	9.7	88,012	57,984	67,307	38,068
Europe:												
Norway	28	18	19	15	27.0	27.6	20.9	35.9	780	497	586	538
Sweden	836	682	633	695	26.2	24.9	25.6	30.3	21,911	16,954	16,209	12,204
Denmark	535	361	380	369	24.6	26.8	27.4	26.1	13,163	9,683	10,411	8,661
Netherlands	501	485	438	475	31.4	35.7	37.5	31.4	15,781	17,333	18,300	13,125
Belgium	559	672	567	574	36.8	40.5	39.1	32.5	20,564	23,154	22,162	18,629
Luxemburg	19	15	22	22	18.4	23.5	23.1	21.8	349	542	416	480
France	2,198	1,900	1,877	1,878	18.5	17.9	19.8	15.6	40,645	34,070	36,463	29,255
Spain	1,802	1,535	1,519	1,551	15.4	10.7	15.1	13.9	27,721	16,398	22,935	31,013
Portugal	604	404	394	406	8.5	9.8	11.9	12.1	5,110	3,946	4,686	4,901
Italy	317	311	308	288	19.2	21.0	22.4	20.3	6,100	6,535	6,127	6,195
Switzerland	55	53	50	46	31.8	35.0	33.2	29.7	1,747	1,962	1,862	1,439
Germany	10,745	11,452	11,641	10,738	23.8	26.0	27.5	24.4	255,937	335,489	321,045	302,312
Austria	878	925	927	904	18.3	21.2	21.7	20.3	15,086	19,920	20,097	18,322
Czechoslovakia	2,128	2,560	2,586	2,433	24.5	28.2	26.8	27.2	52,200	72,268	72,185	50,468
Hungary	1,531	1,608	1,611	1,484	13.6	15.2	14.4	14.5	20,839	32,687	31,423	27,575
Yugoslavia	477	498	552	622	15.2	15.2	14.1	12.8	7,297	8,268	7,895	7,614
Greece	54	137	128	143	12.5	12.6	10.5	11.4	6,091	7,791	7,245	7,815
Bulgaria	442	457	536	657	13.2	16.6	13.7	10.2	5,831	5,067	7,860	12,072
Rumania	629	781	773	998	12.1	15.7	17.2	18.6	7,621	11,493	13,264	15,747
Poland	12,911	13,197	14,528	14,567	16.0	18.2	16.3	13.8	208,884	240,545	276,969	279,923
Lithuania	1,365	1,113	1,165	1,262	16.9	16.2	14.8	21.1	22,542	18,762	23,177	16,121
Latvia	874	637	681	660	15.3	13.3	16.2	21.8	9,585	8,469	9,553	6,466
Estonia	804	857	867	866	15.9	15.5	17.4	24.2	9,246	6,567	6,768	6,667
Finland	578	650	694	692	19.6	20.0	20.7	21.3	11,316	10,989	10,443	11,792
Russia	59,672	64,460	69,681	72,233	11.4	11.6	11.9	28.1	676,304	749,979	818,497	14,104
Total European countries reporting all years	39,663	40,109	41,499	42,127	19.6	22.4	22.5	21.8	776,898	898,580	933,497	764,771

[illegible]

Bureau of Agricultural Economies. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1980-81 the crop harvested in the Northern Hemisphere countries in 1980 is combined with the Southern Hemisphere harvest which begins late in 1980 and ends early in 1981.

### Preliminary.

**4-year average.**

**Area sown.**

**8-year average.**

**6 Less than 500 acre**

TABLE 38.—*Rye: World production, 1894-95 to 1931-32*

Crop year	World production excluding Russia and China	Northern Hemisphere production excluding Russia and China	European production excluding Russia	Selected countries						
				Russia <sup>1</sup>	United States	Germany	France	Poland	Hungary	Czechoslovakia
	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels
1894-95	663	662	618	868	30	279	75		58	
1895-96	620	618	573	773	31	260	72		47	
1896-97	664	663	621	790	29	285	70		51	
1897-98	599	598	551	654	33	273	48		36	
1898-99	667	666	619	738	33	267	67		46	
1899-1900	710	708	664	912	30	342	67		50	
1900-1901	675	673	629	820	31	337	59		42	
1901-2	690	688	644	755	31	321	58		44	
1902-3	733	731	682	919	35	374	46		58	
1903-4	768	767	721	912	32	391	58		51	
1904-5	755	754	709	1,008	32	396	53		46	
1905-6	782	781	732	737	35	378	59		53	
1906-7	787	785	736	668	37	379	51		54	
1907-8	751	749	700	815	35	384	56		42	
1908-9	827	826	776	790	36	423	52		48	
1909-10	872	870	821	904	35	447	56		47	
1910-11	818	816	768	875	35	414	44		52	
1911-12	828	826	779	769	33	428	47		54	
1912-13	862	860	810	1,051	36	457	49		57	
1913-14	892	889	834	1,011	41	481	50		56	
1914-15	766	763	707	2,870	43	410	44		45	
1915-16	691	689	621	3,910	54	360	33		48	
1916-17	663	661	598	4,771	49	352	33			
1917-18	548	545	466	614	63	228	25			
1918-19	590	588	476		91	260	29			
1919-20	681	679	581		75	238	31	103		
1920-21	619	616	533	368	60	194	37	74	20	33
1921-22	859	856	766	401	62	268	44	175	23	54
1922-23	869	864	721	568	103	206	38	203	25	51
1923-24	932	926	833	784	63	263	37	243	31	53
1924-25	745	741	655	737	66	226	40	148	22	45
1925-26	1,016	1,009	947	906	46	317	44	265	33	58
1926-27	930	923	763	941	41	252	30	204	31	56
1927-28	904	893	814	950	58	269	34	232	22	60
1928-29	980	970	905	750	43	335	34	241	33	72
1929-30 <sup>4</sup>	1,010	1,004	940	818	35	321	36	276	31	72
1930-31 <sup>5</sup>	1,014	1,008	926		45	302	29	274	28	70
1931-32 <sup>6</sup>		825	773		33	283	31	223	22	50

Bureau of Agricultural Economics. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus, for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

<sup>1</sup> Includes all Russian territory reporting for the years shown.

<sup>2</sup> Exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.

<sup>3</sup> Exclusive of Russian Poland, Lithuania, parts of Latvia and the Ukraine, and the two Provinces of Batum and Elizabetpol in Transcaucasia.

<sup>4</sup> Beginning with this year, estimates for the present territory of the Union of Socialist Soviet Republics exclusive of Turkestan, Transcaucasia, and the Far East, which territory in 1924 produced 8,646,000 bushels.

<sup>5</sup> Beginning with this year postwar boundaries, therefore not comparable with earlier years.

<sup>6</sup> Preliminary.

# STATISTICS OF GRAINS

605

TABLE 39.—*Rye: Monthly marketings by farmers, as reported by about 3,500 mills and elevators, United States, 1921-22 to 1930-31*

Crop year	Percentage of year's receipts											
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1921-22	13.9	20.8	17.6	10.6	6.3	5.9	4.5	4.8	4.9	4.0	4.2	2.5
1922-23	10.7	20.5	14.8	12.3	10.2	8.7	6.5	5.3	4.0	2.9	2.2	1.9
1923-24	5.3	18.8	19.2	14.2	9.4	8.5	5.4	3.9	3.5	2.5	3.0	4.3
1924-25	3.9	16.9	25.4	23.3	10.7	7.0	5.0	3.1	1.7	1.0	1.2	0.8
1925-26	5.2	19.2	23.3	12.4	8.7	8.9	6.6	4.6	3.1	2.4	2.8	2.8
1926-27	8.0	20.1	19.7	13.0	8.5	6.0	6.0	6.0	3.7	2.6	3.0	3.4
1927-28	4.7	19.0	25.6	17.5	9.8	5.8	4.4	4.1	3.7	2.4	1.7	1.3
1928-29	4.5	19.5	27.0	16.3	9.3	6.1	4.5	5.1	2.9	1.9	1.4	1.5
1929-30	12.3	34.0	18.0	11.6	6.6	6.0	3.4	2.3	1.7	1.4	1.5	1.2
1930-31	12.7	33.4	22.5	11.0	4.5	4.0	2.4	2.8	1.8	1.8	1.8	1.3

Bureau of Agricultural Economics.

TABLE 40.—*Rye: Receipts at specified markets, 1921-22 to 1930-31*

Year beginning July	Minneapolis	Duluth	Chicago	Milwaukee	Omaha	Total, 5 markets	Fort William and Fort Arthur <sup>1</sup>
	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>
1921-22	4,754	17,444	4,235	2,282	2,048	30,763	5,297
1922-23	15,111	42,744	7,585	3,241	1,916	70,597	11,552
1923-24	13,336	16,836	2,952	1,449	736	35,309	6,837
1924-25	8,447	38,496	12,586	2,733	1,207	63,469	5,255
1925-26	7,872	10,907	2,426	876	892	22,973	5,329
1926-27	4,123	13,351	2,355	1,298	941	22,038	7,763
1927-28	5,423	25,083	4,151	673	1,504	36,899	11,983
1928-29	7,375	10,881	5,288	1,053	1,354	25,951	8,130
1929-30	7,057	7,039	7,629	736	1,755	24,215	5,891
1930-31 <sup>2</sup>	9,434	3,140	3,512	242	778	17,156	7,024

Bureau of Agricultural Economics. Compiled from reports of Minneapolis Chamber of Commerce, Duluth Board of Trade, Chicago Board of Trade, Milwaukee Chamber of Commerce, Omaha Grain Exchange, Grain and Feed Journal, and Canadian Grain Statistics.

<sup>1</sup> Crop year begins September.

<sup>2</sup> Preliminary.

TABLE 41.—*Rye: Classification of receipts graded by licensed inspectors, all inspection points, 1923-24 to 1930-31*

Year beginning July	Grade					
	No. 1	No. 2	No. 3	No. 4	Sample	Total
	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>
1923-24	14,394	13,532	3,872	1,061	473	33,332
1924-25	27,977	24,251	8,841	2,957	876	64,902
1925-26	3,969	11,730	5,111	1,794	494	23,098
1926-27	3,892	9,921	5,794	3,597	1,445	24,649
1927-28	10,659	15,573	4,976	1,409	564	33,181
1928-29	1,787	13,081	6,646	1,994	626	24,134
1929-30	8,985	10,611	1,642	475	288	22,001
1930-31	5,804	9,320	1,198	225	103	16,650

Bureau of Agricultural Economics.

TABLE 42.—*Rye: Commercial stocks in store, 1926-27 to 1930-31*DOMESTIC RYE IN UNITED STATES<sup>1</sup>

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1926-27							13,062	12,880	13,897	13,905	7,818	8,783
1927-28	1,018	1,454	2,091	2,608	2,077	2,970	3,281	4,027	4,321	5,090	5,544	2,662
1928-29	2,499	2,170	1,851	2,684	4,771	5,589	6,176	6,185	6,440	6,914	6,598	6,532
1929-30	6,632	6,614	8,561	9,771	11,453	12,033	12,914	14,536	14,379	14,282	13,701	12,872
1930-31	12,481	12,073	14,248	17,010	17,291	17,173	16,361	15,629	14,270	13,199	10,990	10,599
1931-32	9,989	9,838	9,405	10,095	10,376	10,431						

## UNITED STATES RYE IN CANADA

1926-27							1,658	1,704	1,583	1,884	3,379	869
1927-28	1,465	589	686	1,385	1,390	1,208	980	772	351	289	47	512
1928-29	750	449	357	838	1,248	1,478	1,707	1,426	1,255	1,310	1,367	1,379
1929-30	1,132	1,255	1,540	2,900	2,883	2,113	2,734	2,720	2,619	2,692	2,871	3,321
1930-31	3,789	3,761	3,432	3,139	2,792	2,900	2,151	2,128	2,126	2,119	2,110	1,911
1931-32	1,682	1,792	1,775	1,229	821	782						

CANADIAN RYE IN UNITED STATES<sup>2</sup>

1926-27							2,266	1,922	1,631	494	689	792
1927-28	63	50	20	124	441	802	851	453	203	90	90	371
1928-29	248	255	12	83	205	258	208	532	559	440	451	480
1929-30	380	394	432	320	429	431	431	431	371	370	426	270
1930-31	188	187	172	172	430	651	489	446	828	349	273	2
1931-32	2	2	2	390	388	1,405						

Bureau of Agricultural Economics. Compiled from weekly reports to the grain, hay, and feed market news service. Data are for stocks on the Saturday nearest the 1st day of the month.

<sup>1</sup>Includes rye in store in public and private elevators in 42 important markets and also the rye afloat in vessels or barges in harbors of lake and seaboard ports. Rye in transit either by rail or water, mill stocks or small private stocks of rye intended only for local purposes, not included.

<sup>2</sup>Includes rye stored at lake and seaboard ports, exclusive of rye in transit on lakes and canals.

TABLE 43.—*Rye: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32*

Crop year	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	Weighted average
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1922-23	74.0	68.9	63.2	65.2	68.2	70.7	71.7	71.0	70.1	70.8	69.2	62.2	68.1
1923-24	56.3	55.3	57.2	58.3	62.1	63.9	63.5	64.5	62.8	60.4	60.1	61.6	59.4
1924-25	68.8	79.8	80.1	105.7	108.6	112.7	126.2	132.2	125.1	100.9	103.6	101.8	96.3
1925-26	92.3	92.8	81.9	74.1	73.4	86.8	88.2	82.5	73.4	73.8	72.5	76.0	83.1
1926-27	80.7	86.1	81.6	82.4	83.0	82.4	83.6	83.4	86.4	85.2	90.1	94.9	84.2
1927-28	91.2	80.6	81.4	81.0	84.0	87.8	88.0	89.5	96.0	99.8	111.5	106.8	84.7
1928-29	99.2	83.6	81.8	87.1	86.3	87.2	87.9	91.5	91.5	86.0	79.1	75.7	85.4
1929-30	85.8	91.8	89.2	89.9	85.5	88.4	85.7	78.3	68.4	68.7	63.8	60.7	87.7
1930-31	43.6	53.0	53.1	47.6	41.6	41.1	37.4	34.9	34.3	32.8	33.0	31.4	48.0
1931-32	33.0	32.5	33.2	33.6	41.4	36.8							

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices reported on 1st of month and 1st of succeeding month, July, 1922-December, 1923.

## STATISTICS OF GRAINS

607

TABLE 44.—*Rye, including flour in terms of grain: International trade, average 1925-26 to 1929-30, annual 1927-28 to 1930-31*

Country	Year beginning July									
	Average 1925-26 to 1929-30		1927-28		1928-29		1929-30		1930-31 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
<b>PRINCIPAL EXPORT- ING COUNTRIES</b>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>
Germany.....	15,498	13,815	10,199	24,861	22,965	7,234	20,441	5,085	4,513	1,233
United States.....	14,556	0	26,346	0	9,488	0	2,600	0	195	0
Russia.....	7,482	0	5,901	0	237	0	0	0	0	0
Poland.....	6,597	2,453	375	4,831	1,415	792	14,170	31	15,743	10
Hungary.....	6,559	1	4,432	1	5,136	1	5,942	0	3,321	0
Canada.....	6,328	129	10,379	114	6,430	168	885	293	1,908	18
Argentina.....	4,511	0	7,080	0	5,862	0	1,916	0	1,610	0
Rumania.....	1,133	12	2,187	0	914	8	661	30	2,162	10
Bulgaria.....	486	0	807	0	1,046	0	14	0	2,444	0
Yugoslavia <sup>4</sup> .....	176	6	13	18	54	9	60	1	0	0
Algeria <sup>4</sup> .....	46	2	40	0	62	6	0	0	0	0
<b>Total.....</b>	<b>63,372</b>	<b>16,418</b>	<b>67,739</b>	<b>29,825</b>	<b>53,609</b>	<b>8,216</b>	<b>46,662</b>	<b>5,269</b>	<b>31,961</b>	<b>1,261</b>
<b>PRINCIPAL IMPORT- ING COUNTRIES</b>										
Denmark.....	414	8,109	417	7,461	392	7,216	394	10,767	423	13,471
Norway.....		7,027		7,307		6,034		7,047		5,216
Finland.....	10	6,193	10	4,932	12	7,767	9	6,509	5	3,136
Czechoslovakia.....	963	4,701	102	7,622	1,664	2,581	2,815	502	990	717
Austria.....	103	4,645	101	4,617	64	5,054	69	5,258	86	4,592
Netherlands.....	523	4,525	629	4,147	531	3,451	207	4,943	1,454	11,346
Latvia <sup>4</sup> .....	25	3,203	9	1,960	16	5,366	12	3,914	0	465
Sweden.....	537	3,003	636	4,177	260	4,550	49	4,225	20	1,131
Estonia.....		2,244		1,086		2,680		3,591		515
Belgium.....	43	1,625	67	753	33	376	15	1,598	240	6,294
France.....	31	1,535	8	753	5	573	12	441	19	4,364
United Kingdom <sup>4</sup> .....	98	698	83	717	42	439	25	315	13	346
Italy.....	9	386	17	107	1	219	1	575	1	1,324
Switzerland.....	0	61		53		6		296	0	296
<b>Total.....</b>	<b>2,761</b>	<b>47,988</b>	<b>2,079</b>	<b>45,631</b>	<b>3,020</b>	<b>46,362</b>	<b>3,608</b>	<b>49,961</b>	<b>3,241</b>	<b>53,135</b>

Bureau of Agricultural Economics. Official sources except where otherwise noted.

<sup>1</sup> Preliminary.<sup>2</sup> 4-year average.<sup>3</sup> Monthly Crop Report and Agricultural Statistics.<sup>4</sup> Year beginning August 1; International Yearbook of Agricultural Statistics.<sup>5</sup> Calendar year.TABLE 45.—*Rye No. 2: Weighted average price<sup>1</sup> per bushel of reported cash sales, Minneapolis, 1922-23 to 1931-32*

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Weight- ed aver- age
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1922-23.....	76	69	66	71	81	83	82	80	76	81	72	64	75
1923-24.....	61	63	66	66	64	65	67	66	63	61	63	70	65
1924-25.....	83	86	95	121	123	133	154	130	106	114	111	111	114
1925-26.....	95	100	83	77	81	98	99	91	81	85	83	89	88
1926-27.....	102	97	93	95	94	99	102	99	99	109	111	98	98
1927-28.....	104	92	92	92	99	102	103	106	114	124	128	123	104
1928-29.....	111	94	94	94	98	97	101	105	100	89	85	84	95
1929-30.....	107	98	97	97	95	98	91	78	66	68	65	57	90
1930-31.....	55	60	55	49	43	44	38	37	36	35	36	37	51
1931-32.....	37	38	39	41	51	45							

Bureau of Agricultural Economics. Compiled from Minneapolis Daily Market Record. Chicago prices, 1909-1927 appear in 1927 Yearbook, Table 46. Minneapolis prices, 1909-1921, appear in 1930 Yearbook, Table 43.

<sup>1</sup> A average of daily prices weighted by car-lot sales.

TABLE 46.—*Corn: Acreage, production, value, exports, etc., United States, 1890-1931*

Year	Acreage	Average yield per acre	Production	Production as grain	Price per bushel received by producers Dec. 1	Farm value, basis Dec. 1 farm price	Price per bushel at Chicago <sup>1</sup>	Foreign trade, including meal, year beginning July <sup>2</sup>			
								Domestic exports	Imports	Net exports <sup>3</sup>	
										Total	Percentage of production
	1,000 acres	Bushels of 56 lbs. shelled	1,000 bushels	1,000 bushels	Cents	1,000 dollars	Cents	1,000 bushels	1,000 bushels	1,000 bushels	Per cent
1890	70,390	20.7	1,460,406		50.0	729,647	58	32,042	2	32,039	2.2
1891	74,496	27.6	2,055,823		39.7	816,917	47	76,602	16	76,586	3.7
1892	72,610	23.0	1,713,688		38.8	644,390	41	47,122	2	47,120	2.7
1893	74,434	22.9	1,707,572		35.9	612,998	41	66,490	8	66,482	3.9
1894	69,396	19.3	1,339,680		45.1	604,523	44	28,585	17	28,569	2.1
1895	85,567	27.0	2,310,952		25.0	878,408	26	101,100	5	101,096	4.4
1896	86,560	28.9	2,508,494		21.3	532,884	25	178,817	7	178,811	7.1
1897	88,127	24.3	2,144,553		26.0	558,309	30	212,056	4	212,052	9.9
1898	88,304	25.6	2,261,119		28.4	642,747	34	177,255	4	177,252	7.8
1899	91,914	28.1	2,666,584								
1899	94,914	25.9	2,454,628		29.9	734,916	36	218,123	3	218,121	8.7
1900	95,042	28.4	2,505,148		35.1	878,243	43	181,405	5	181,400	7.2
1901	94,636	17.0	1,613,528		60.1	969,285	62	28,029	19	28,011	1.7
1902	95,517	27.4	2,619,499		40.1	1,049,791	47	76,639	41	76,598	2.9
1903	90,661	25.9	2,346,897		42.1	987,882	49	58,222	17	58,210	2.5
1904	93,340	27.1	2,528,662		43.7	1,105,690	48	90,293	16	90,278	3.6
1905	93,573	29.4	2,748,949		40.8	1,120,513	44	119,894	11	119,883	4.4
1906	93,643	30.9	2,897,662		39.3	1,138,053	50	86,368	11	86,358	3.0
1907	94,971	26.5	2,512,065		50.9	1,277,607	68	55,064	20	55,044	2.2
1908	95,603	26.6	2,544,957		60.0	1,527,679	65	37,665	253	37,437	1.5
1909	98,333	25.9	2,559,190								
1909	98,383	26.1	2,572,336		58.6	1,507,185	59	38,128	118	38,010	1.5
1910	104,035	27.7	2,886,260		48.0	1,384,817	53	65,615	53	65,562	2.3
1911	105,826	23.9	2,631,488		61.8	1,565,258	71	41,797	54	41,744	1.6
1912	107,063	30.2	3,224,746		43.7	1,520,454	53	50,780	903	49,877	1.6
1913	105,820	23.1	2,446,988		90.1	1,692,092	70	10,726	12,368	11,639	1.2
1914	103,425	25.8	2,672,804		64.4	1,722,070	70	50,668	9,899	40,769	1.5
1915	106,197	26.2	2,794,793		57.5	1,722,680	79	39,897	5,211	34,686	1.2
1916	106,266	24.4	2,556,927		58.9	2,280,729	111	66,753	2,270	64,483	2.5
1917	110,730	26.3	2,865,233		127.9	3,920,228	168	49,078	3,197	45,881	1.5
1918	104,467	24.0	2,502,665		136.5	3,416,240	162	23,019	3,346	19,684	.8
1919	87,772	26.7	2,325,859								
1919	97,170	26.9	2,611,802		134.5	3,780,897	159	16,729	10,285	6,444	.2
1920	101,699	31.5	3,208,584		67.0	2,150,332	62	70,906	5,791	65,115	2.1
1921	103,740	29.6	3,068,569		42.3	1,297,213	55	179,490	142	179,348	5.8
1922	102,846	28.3	2,906,020		65.8	1,910,775	73	96,996	182	96,814	3.3
1923	104,324	29.3	3,063,587	2,600,891	72.6	2,217,229	88	28,135	240	22,896	.7
1924	82,329	22.9	1,825,580								
1924	100,863	22.9	2,309,414	1,900,204	98.2	2,266,771	106	9,791	4,618	5,173	.2
1925	101,302	23.8	2,416,106	2,445,632	67.4	1,966,162	75	24,783	637	24,146	.8
1926	99,615	27.0	2,691,531	2,238,173	64.2	1,728,970	87	19,819	1,098	18,721	.7
1927	98,393	28.1	2,763,093	2,300,845	72.3	1,997,769	101	19,409	5,463	14,946	.5
1928	100,673	28.0	2,813,901	2,364,069	75.2	2,119,046	92	41,874	4,693	41,387	1.5
1929	97,806	25.9	2,535,386	2,140,177	77.4	1,962,832	83	10,281	497	9,784	.4
1930	100,743	24.0	2,460,185	1,717,883	65.5	1,349,218	60	8,317	1,747	1,572	.1
1931	104,970	24.4	2,556,863	2,194,574	36.0	920,142					

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board and relate to equivalent production of grain on entire acreage grown for all purposes; italic figures are census returns. See 1927 Yearbook, p. 774, for data for earlier years.

<sup>1</sup> Prices 1890-1898 are averages of the weekly quotations for No. 2 or better in annual reports of Chicago Board of Trade; subsequent prices are compiled from the Chicago Daily Trade Bulletin, average of daily prices weighted by car-lots sales, No. 3 yellow.

<sup>2</sup> Compiled from Commerce and Navigation of the United States, 1890-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1923; January and June issues, 1927-1931 and official records of the Bureau of Foreign and Domestic Commerce. Corn—General imports 1890-1909 and 1912-1931; imports for consumption 1910-11. Corn meal—Imports for consumption, 1890-1931. Corn meal converted to terms of grain on the basis of 4 bushels of corn to a barrel of meal.

<sup>3</sup> Total exports (domestic plus foreign) minus total imports.

<sup>4</sup> Net imports, i. e., total imports minus total exports (domestic and foreign).

<sup>5</sup> Corn harvested for grain; total acreage of corn in 1924 is 98,401,627 acres.

<sup>6</sup> Preliminary.

# STATISTICS OF GRAINS

609

TABLE 47.—Corn: Acreage and production, by States, average 1924-1928, annual 1928-1931

State and division	Acreage					Production				
	Average, 1924-1928	1928	1929	1930	1931 <sup>1</sup>	Average, 1924-1928	1928	1929	1930	1931 <sup>1</sup>
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.
Maine.....	13	13	13	13	14	510	520	520	546	588
New Hampshire.....	14	14	13	13	18	3,668	560	533	585	598
Vermont.....	83	80	62	60	64	3,668	3,520	2,542	2,580	2,944
Massachusetts.....	44	45	40	39	37	1,950	1,890	1,560	1,755	1,591
Rhode Island.....	9	10	9	9	8	373	390	372	378	344
Connecticut.....	54	55	50	51	51	2,321	2,310	2,150	2,142	2,142
New York.....	670	650	566	555	566	23,197	22,100	17,603	16,650	22,074
New Jersey.....	188	181	170	168	170	7,951	6,968	6,290	6,048	6,970
Pennsylvania.....	1,334	1,283	1,231	1,219	1,268	55,440	50,037	45,547	26,818	62,766
North Atlantic.....	2,410	2,331	2,154	2,127	2,191	96,048	88,295	77,117	57,502	100,017
Ohio.....	3,557	3,646	3,473	3,438	3,576	132,495	136,725	119,818	87,669	160,920
Indiana.....	4,496	4,483	4,253	4,406	4,555	156,960	157,802	131,843	117,009	168,535
Illinois.....	9,117	9,570	8,575	8,832	9,185	326,691	367,438	304,412	229,632	339,845
Michigan.....	1,545	1,461	1,197	1,245	1,407	50,733	48,944	29,925	26,768	40,944
Wisconsin.....	2,142	2,121	1,942	1,981	2,080	77,770	89,082	67,970	67,354	58,240
Minnesota.....	4,267	4,089	4,359	4,533	4,896	137,379	139,026	156,924	140,533	115,056
Iowa.....	11,084	11,202	11,048	11,335	11,640	417,137	464,883	444,130	385,390	389,940
Missouri.....	6,314	6,260	5,566	6,123	6,184	175,139	181,540	130,801	85,722	170,060
North Dakota.....	1,068	997	1,005	1,035	1,159	28,952	24,426	15,075	18,112	21,442
South Dakota.....	4,609	4,469	5,095	5,146	4,857	98,617	93,849	120,752	82,336	25,152
Nebraska.....	8,910	8,987	9,516	9,564	10,138	214,881	212,701	242,658	239,100	172,946
Kansas.....	6,148	6,634	6,643	6,776	6,505	131,664	179,118	116,252	81,312	113,538
North Central.....	63,287	63,809	62,672	64,474	66,162	1,942,848	2,093,584	1,880,560	1,560,927	1,776,318
Delaware.....	136	136	134	138	146	4,416	4,488	3,618	2,622	4,745
Maryland.....	536	530	499	508	545	21,064	19,345	15,718	6,858	20,710
Virginia.....	1,625	1,626	1,454	1,498	1,527	41,546	44,715	35,187	16,478	43,061
West Virginia.....	473	459	434	421	446	15,649	16,524	12,326	5,052	12,984
North Carolina.....	2,360	2,305	1,985	2,233	2,345	46,929	42,642	37,715	40,194	48,072
South Carolina.....	1,516	1,422	1,392	1,531	1,608	20,780	17,064	20,184	22,200	22,994
Georgia.....	3,840	3,620	3,432	3,672	3,672	47,049	38,010	41,184	36,036	36,720
Florida.....	532	607	648	648	674	7,971	7,891	6,804	5,832	5,729
South Atlantic.....	11,059	10,705	9,978	10,409	10,963	205,434	190,679	172,736	135,272	194,965
Kentucky.....	3,052	3,029	2,843	2,815	2,871	80,949	66,638	66,810	28,150	80,388
Tennessee.....	3,044	2,915	2,816	2,788	2,872	68,522	58,842	63,923	39,032	71,800
Alabama.....	2,794	2,650	2,634	2,819	3,101	39,010	30,475	36,876	29,600	43,414
Mississippi.....	1,964	1,765	1,999	1,999	2,299	31,628	24,710	35,382	22,988	42,532
Arkansas.....	2,010	2,002	1,866	1,776	1,954	34,733	34,034	28,923	8,347	43,965
Louisiana.....	1,201	1,242	1,190	1,119	1,287	19,516	21,114	18,802	12,309	20,592
Oklahoma.....	2,800	3,050	3,070	3,193	3,321	57,816	70,150	46,050	35,762	51,808
Texas.....	4,131	4,722	4,251	4,634	5,236	82,719	99,125	70,142	74,144	94,248
South Central.....	20,996	21,375	20,609	21,143	22,941	414,894	408,125	366,908	250,332	448,747
Montana.....	351	274	134	141	123	6,093	5,206	1,608	1,692	1,722
Idaho.....	68	53	32	35	42	2,697	2,433	1,120	1,330	1,428
Wyoming.....	178	167	160	192	186	3,253	2,672	2,080	3,552	1,953
Colorado.....	1,396	1,438	1,533	1,732	1,836	16,806	18,694	22,228	33,970	19,273
New Mexico.....	198	199	250	257	283	3,500	3,482	4,425	3,598	5,690
Arizona.....	39	39	29	31	36	1,048	1,014	435	496	578
Utah.....	18	18	15	16	16	440	522	465	496	320
Nevada.....	2	2	2	2	2	47	44	56	46	40
Washington.....	48	46	33	34	37	1,684	1,794	1,172	1,292	1,369
Oregon.....	74	82	63	60	62	2,440	2,932	2,016	1,890	1,890
California.....	78	75	82	90	90	2,576	2,400	2,460	2,700	2,610
Western.....	2,447	2,393	2,333	2,590	2,713	40,585	41,218	38,065	56,152	36,816
United States.....	100,169	100,673	97,806	100,743	104,970	2,699,809	2,818,901	2,535,386	2,060,185	2,556,863

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.

TABLE 48.—*Corn: Yield per acre, average 1919-1928, and annual 1926-1931, and estimated price per bushel December 1, average 1925-1929, and annual 1926-1931, by States*

State and division	Yield per acre							Estimated price per bushel Dec. 1						
	Average, 1919-1928	1926	1927	1928	1929	1930	1931	Average, 1925-1929	1926	1927	1928	1929	1930	1931
	Bu.s.	Bu.s.	Bu.s.	Bu.s.	Bu.s.	Bu.s.	Bu.s.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
Maine.....	42.9	35.0	37.0	40.0	40.0	42.0	42.0	111	100	110	115	120	100	70
New Hampshire.....	45.2	43.0	41.0	40.0	41.0	45.0	46.0	107	100	105	120	110	105	68
Vermont.....	45.0	43.0	39.0	44.0	41.0	43.0	46.0	108	95	105	110	105	100	63
Massachusetts.....	44.5	44.0	41.0	42.0	39.0	45.0	43.0	122	115	120	130	135	100	60
Rhode Island.....	41.2	41.0	38.0	39.0	41.3	42.0	43.0	126	115	120	135	140	110	60
Connecticut.....	44.3	42.0	38.0	42.0	43.0	42.0	42.0	117	115	120	130	110	105	70
New York.....	37.0	35.0	34.0	34.0	31.1	30.0	39.0	96	86	96	99	103	90	60
New Jersey.....	42.4	46.0	40.0	38.5	37.0	36.0	41.0	87	80	85	97	101	95	52
Pennsylvania.....	43.1	41.0	39.5	39.0	37.0	22.0	49.5	88	78	91	98	100	95	46
North Atlantic.....	41.5	39.9	37.9	37.9	35.8	27.0	45.5	92.4	82.7	93.9	97.7	102.3	94.5	51.1
Ohio.....	39.2	41.0	32.5	37.5	34.5	25.5	45.0	70	60	77	76	78	67	34
Indiana.....	36.3	38.0	31.5	35.2	31.0	26.2	37.0	63	50	68	69	74	61	28
Illinois.....	35.6	35.0	30.0	38.4	35.5	26.0	37.0	65	56	71	70	72	62	30
Michigan.....	34.8	34.0	27.5	33.5	25.0	21.5	29.1	81	73	85	84	89	77	40
Wisconsin.....	39.7	34.5	32.5	42.0	35.0	34.0	28.0	78	75	84	78	83	72	47
Minnesota.....	34.9	34.0	30.5	34.0	36.0	31.0	23.5	61	56	64	62	65	53	37
Iowa.....	40.3	39.0	35.5	41.5	40.2	34.0	33.5	64	56	69	67	70	58	35
Missouri.....	28.6	27.2	29.0	29.0	23.5	14.0	27.5	74	68	75	73	86	75	33
North Dakota.....	25.8	18.0	25.0	24.5	15.0	17.5	18.5	63	68	62	61	68	53	37
South Dakota.....	26.0	18.0	29.0	21.0	23.7	16.0	5.2	60	58	57	62	62	47	41
Nebraska.....	28.6	15.5	33.1	23.8	25.5	25.0	17.0	66	68	62	71	69	51	38
Kansas.....	21.1	11.0	30.0	27.0	17.5	12.0	17.5	67	70	61	65	74	59	31
North Central.....	32.8	29.0	31.5	32.8	30.0	24.2	26.8	65.5	59.7	68.0	69.3	72.2	59.1	33.9
Delaware.....	33.0	31.0	35.0	33.0	27.0	19.0	32.5	77	64	80	88	88	91	40
Maryland.....	39.4	39.8	44.0	36.5	31.5	13.5	38.0	78	64	80	88	88	93	40
Virginia.....	26.8	27.5	29.5	27.5	24.2	11.0	28.2	96	85	92	100	100	105	46
West Virginia.....	33.5	33.0	33.5	36.0	28.4	12.0	39.0	101	94	100	103	108	109	52
North Carolina.....	20.3	22.0	22.8	18.5	19.0	18.0	20.5	98	88	91	103	100	93	43
South Carolina.....	15.1	15.5	17.0	12.0	14.5	14.5	14.3	99	90	90	106	98	90	44
Georgia.....	13.0	14.5	14.0	10.5	12.0	10.5	10.0	90	76	81	105	88	86	46
Florida.....	13.8	14.0	13.0	13.0	10.5	9.0	8.5	95	92	97	100	85	90	53
South Atlantic.....	19.3	20.5	21.0	17.8	17.3	13.0	17.8	93.2	82.4	88.2	101.0	95.5	92.5	44.8
Kentucky.....	26.9	33.0	26.0	22.0	23.5	10.0	28.0	84	65	88	96	91	92	36
Tennessee.....	23.5	27.5	24.0	19.5	22.7	14.0	25.0	86	66	83	100	92	93	38
Alabama.....	14.2	16.2	16.0	11.5	14.0	10.5	14.0	95	76	92	110	98	96	41
Mississippi.....	16.2	19.2	17.8	14.0	17.7	11.5	18.5	93	82	93	102	93	98	40
Arkansas.....	13.5	20.5	19.0	17.0	15.5	4.7	22.5	91	80	87	91	98	96	37
Louisiana.....	17.0	17.5	17.5	17.0	15.8	11.0	18.0	92	90	90	94	90	93	47
Oklahoma.....	20.8	28.0	26.5	23.0	15.0	11.2	15.6	70	56	59	68	79	65	30
Texas.....	21.6	27.8	23.0	21.0	16.5	16.0	18.0	80	60	65	78	85	73	32
South Central.....	20.4	24.5	22.0	18.9	17.8	11.8	19.5	82.8	67.5	77.3	88.2	89.9	83.9	36.3
Montana.....	17.4	11.0	23.5	19.0	12.0	12.0	14.0	85	92	72	82	84	66	57
Idaho.....	33.3	41.0	41.0	46.0	35.0	38.0	34.0	87	90	82	92	94	70	53
Wyoming.....	20.4	20.0	20.0	16.0	13.0	18.5	10.5	75	72	74	75	85	67	45
Colorado.....	15.2	7.0	15.5	13.0	14.5	22.5	10.5	70	71	68	68	75	62	40
New Mexico.....	18.4	20.0	15.0	17.5	17.7	14.0	20.0	92	87	93	89	89	77	43
Arizona.....	27.4	28.0	32.0	26.0	15.0	16.0	16.0	124	120	115	125	130	115	86
Utah.....	23.9	24.0	27.0	29.0	31.0	31.0	30.0	107	115	110	110	100	100	69
Nevada.....	25.1	24.0	25.0	22.0	28.0	28.0	20.0	117	120	115	112	120	115	70
Washington.....	36.6	35.0	37.0	39.0	35.5	38.0	37.0	96	95	90	99	103	88	50
Oregon.....	32.0	33.0	36.0	36.0	32.0	33.0	30.0	100	100	95	100	98	83	65
California.....	33.5	31.5	32.0	32.0	30.0	30.0	29.0	110	106	108	105	112	87	67
Western.....	19.0	13.1	19.9	17.2	16.3	21.7	13.5	82.6	85.8	78.1	81.2	83.6	67.0	46.6
United States.....	28.2	27.0	28.1	28.0	25.9	20.4	24.4	71.3	64.2	72.3	75.2	77.4	65.5	36.0

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

## STATISTICS OF GRAINS

611

TABLE 49.—*Corn: Utilization for grain, silage, hogging down, grazing, and forage, by States, 1930 and 1931*

State and division	1930					1931				
	For grain		For silage		Hogging down, grazing and forage acreage	For grain		For silage		Hogging down, grazing, and forage acreage
	Acreage	Production	Acreage	Production		Acreage	Production	Acreage	Production	
	1,000 acres	1,000 bushels	1,000 acres	1,000 short tons	1,000 acres	1,000 acres	1,000 bushels	1,000 acres	1,000 short tons	1,000 acres
Maine.....	2	84	8	86	3	2	84	9	92	3
New Hampshire.....	3	135	8	34	2	3	135	3	88	2
Vermont.....	6	258	44	440	10	7	322	43	542	9
Massachusetts.....	10	450	23	253	6	9	387	21	235	7
Rhode Island.....	2	84	5	50	2	1	43	5	55	2
Connecticut.....	12	504	33	363	6	12	504	33	346	6
New York.....	111	3,330	339	2,814	105	111	4,329	346	3,806	109
New Jersey.....	130	4,810	30	255	8	134	5,628	29	284	7
Pennsylvania.....	829	18,238	817	1,902	73	913	45,194	317	3,323	38
North Atlantic	1,105	27,893	807	6,247	215	1,192	58,626	816	8,776	183
Ohio.....	2,853	76,460	234	1,264	351	3,081	140,186	152	1,444	343
Indiana.....	3,855	106,784	171	992	440	4,200	155,400	110	869	245
Illinois.....	7,880	204,360	371	2,412	601	8,404	310,943	230	1,725	551
Michigan.....	600	14,400	330	1,551	315	827	25,637	297	2,079	283
Wisconsin.....	731	25,950	1,023	7,161	227	754	21,866	1,095	7,536	231
Minnesota.....	3,006	96,192	494	3,436	1,043	3,116	74,784	523	3,432	1,252
Iowa.....	9,822	333,948	235	2,280	1,228	9,961	333,694	323	2,460	1,351
Missouri.....	5,170	72,380	92	414	861	5,599	153,972	55	344	530
North Dakota.....	138	2,553	68	238	829	168	3,276	71	241	920
South Dakota.....	3,522	59,874	64	230	1,560	2,395	19,639	102	245	2,340
Nebraska.....	8,764	219,100	72	396	728	9,156	155,652	108	454	874
Kansas.....	5,473	68,412	331	1,258	972	5,611	99,198	265	1,192	729
North Central	51,794	1,280,413	3,525	21,632	9,155	53,172	1,494,252	3,341	21,521	9,640
Delaware.....	134	2,546	3	20	1	142	4,615	3	26	1
Maryland.....	463	6,250	34	170	11	510	19,380	25	250	10
Virginia.....	1,213	13,343	124	434	161	1,427	40,241	56	550	45
West Virginia.....	367	4,404	31	155	23	421	12,209	16	162	9
North Carolina.....	2,135	38,430	13	72	85	2,444	46,002	12	64	89
South Carolina.....	1,493	21,648	3	16	35	1,572	22,480	3	18	33
Georgia.....	3,321	34,870	7	32	104	3,540	35,400	7	38	125
Florida.....	616	5,544	2	12	30	645	5,482	2	11	27
South Atlantic	9,742	127,035	217	911	450	10,501	185,809	123	1,109	339
Kentucky.....	2,554	25,540	30	105	231	2,678	74,984	20	140	173
Tennessee.....	2,642	36,988	18	63	128	2,758	68,950	18	108	96
Alabama.....	2,720	28,560	5	20	94	3,060	42,840	5	25	36
Mississippi.....	1,970	23,640	2	7	27	2,259	41,792	2	12	38
Arkansas.....	1,614	7,747	2	6	160	1,808	40,680	2	12	144
Louisiana.....	1,090	11,990	2	10	27	1,261	20,176	2	6	24
Oklahoma.....	2,963	39,778	12	41	213	3,153	50,448	12	54	156
Texas.....	4,440	71,040	8	30	136	5,099	91,782	8	30	129
South Central	19,993	239,283	79	282	1,071	22,076	431,652	69	387	796
Montana.....	16	192	2	10	123	10	175	2	10	111
Idaho.....	21	819	5	45	9	26	910	6	45	10
Wyoming.....	80	1,560	2	16	110	72	900	2	8	112
Colorado.....	1,461	33,608	48	253	225	1,461	16,071	50	200	325
New Mexico.....	221	3,094	3	15	33	243	4,860	4	24	36
Arizona.....	22	352	3	21	6	25	400	4	28	7
Utah.....	7	224	3	33	6	7	154	3	24	6
Nevada.....	1	25	1	8	0	1	24	1	7	0
Washington.....	11	418	9	86	14	11	407	10	100	16
Oregon.....	24	840	21	143	15	25	750	22	143	15
California.....	48	1,632	21	197	21	48	1,584	21	178	21
Western.....	1,912	42,759	116	827	562	1,929	26,235	125	767	669
United States.....	84,548	1,717,383	4,744	29,899	11,453	88,970	2,194,574	4,474	32,860	11,626

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

1 Preliminary.

TABLE 50.—Corn: Acreage, yield per acre, and production in specified countries, average 1921-22 to 1925-26, annual 1928-29 to 1931-32

Country	Acreage				Yield per acre				Production						
	Average, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32	Average, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32	Average, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32
NORTHERN HEMISPHERE															
North America:															
Canada.....	293	130	152	161	131	14.3	37.7	34.1	36.2	41.4	12,974	5,241	5,183	5,826	5,426
United States.....	102,615	100,743	97,806	100,743	104,070	27.8	28.0	25.9	20.4	24.4	2,850,793	2,818,901	2,535,856	2,040,185	2,594,864
Mexico.....	7,575	7,690	7,660	7,688	7,689	11.3	11.1	8.2	7.1	9.6	85,241	85,540	57,824	54,200	75,961
Guatemala.....	380	298	347	418	---	19.9	14.1	14.4	14.7	---	7,772	4,195	5,006	6,137	---
Total North American countries reporting area and production, all years.....															
Estimated North American total.....	110,483	108,562	105,088	108,562	113,040	26.7	26.8	24.7	19.5	23.3	2,949,948	2,908,682	2,598,393	2,120,211	2,638,250
Total.....															
111,800	109,600	106,200	109,700	114,200	---	---	---	---	---	---	2,968,000	2,925,000	2,613,000	2,136,000	2,654,000
Europe:															
France.....	830	849	839	832	833	17.8	14.3	22.2	26.5	28.4	14,754	12,115	18,657	22,023	22,654
Spain.....	1,167	969	1,006	1,106	1,052	22.2	22.3	24.6	26.1	26.1	25,933	21,374	24,788	28,843	26,408
Portugal.....	3,792	3,719	3,719	3,745	3,805	16.5	16.5	16.5	18.0	---	11,795	64,960	14,924	16,722	---
Italy.....	3,140	3,140	3,140	3,140	3,140	26.0	24.7	23.5	23.3	21.4	94,793	64,960	99,622	118,016	78,197
Austria.....	380	355	353	384	388	26.8	24.7	27.4	26.9	26.8	3,553	4,243	4,617	5,756	8,748
Czechoslovakia.....	2,426	2,623	2,774	2,605	2,735	24.1	18.9	25.6	21.3	21.1	18,353	49,662	70,681	58,385	57,665
Hungary.....	4,759	5,018	5,883	6,096	6,158	23.0	14.3	27.8	22.4	20.6	109,899	71,612	163,285	186,993	126,687
Yugoslavia.....	1,458	1,601	1,977	1,889	1,676	14.4	12.7	18.7	18.1	23.4	21,021	20,272	37,005	30,514	39,256
Bulgaria.....	8,799	11,010	11,848	10,838	11,749	10.0	9.9	21.2	10.3	21.3	140,515	108,612	261,410	177,940	250,380
Rumania.....	187	224	218	233	243	14.9	14.9	17.2	14.2	16.4	2,826	3,845	3,752	3,259	3,964
Poland.....	5,238	11,108	8,753	9,684	9,742	17.4	11.4	18.1	---	---	91,244	126,806	158,471	---	---
Russia, European and Asiatic.....															
Total European countries reporting area and production, all years.....															
Estimated European total, excluding Russia.....	23,957	26,492	28,735	27,751	28,623	20.1	13.8	23.8	21.2	21.7	481,691	304,826	682,885	586,962	620,831
Total.....															
25,200	27,900	30,200	29,100	29,900	---	---	---	---	---	---	500,000	394,000	705,000	610,000	643,000
Africa:															
Morocco.....	437	599	600	649	837	8.3	11.5	9.1	9.2	4.4	3,629	6,894	5,455	5,990	3,715
Egypt.....	1,988	2,131	1,917	1,880	---	34.8	36.8	30.2	36.9	---	69,090	78,356	69,462	69,886	---
Total.....															
3,100	3,300	4,200	3,900	4,400	---	---	---	---	---	---	83,000	102,000	108,000	96,000	105,000
Estimated African total.....															

# STATISTICS OF GRAINS

613

Asia:	5,087	6,731	6,641	6,630		13.9	13.4	12.4	15.0		82,482	90,240	82,440	97,080
India.....	1,451	1,421	1,110	1,139	2,441	25.9	25.6	25.7	27.0		1,665	2,588	2,608	
Japan.....	1,487	2,428	2,220	2,139		37.2	35.2	35.3	28.2		1,107	68,162	68,314	67,418
Manchuria.....	261	261	261	263		12.2	12.6	12.4	12.8		2,229	2,190	2,200	
Chosenia.....	220	220	220	230		17.1	17.4	21.5	20.7		2,711	4,353	4,721	
Kwantung.....	1,388	1,284	1,273	1,377		12.4	13.1	11.1	11.5		16,661	16,765	14,737	
Philippines.....						17.1	18.1							
Estimated Asiatic total.....	10,600	12,300	12,300	12,100	11,700						187,000	215,000	205,000	221,000
Total Northern Hemisphere countries reporting area and production, all years.....	136,394	158,021	136,009	139,041	141,941	25.6	24.3	24.5	20.0		3,485,635	3,349,904	3,350,047	3,330,214
Estimated Northern Hemisphere total, excluding Russia.....	150,700	153,100	152,900	154,800	160,200						3,738,000	3,698,000	3,631,000	3,628,000
SOUTHERN HEMISPHERE														
Brazil.....	6,980	12,192				25.4	15.5	25.0	29.4		177,338	188,891	173,878	
Chile.....	62	116	94	92	89	23.6	24.3	4.0	13.8		1,468	2,786	2,340	2,707
Uruguay.....	470	437	452	432		10.5	4.8	20.9	32.9		4,919	2,082	2,082	6,241
Argentina.....	8,063	9,028	10,428	11,315	14,408	28.2	26.6	12.8	12.9		227,983	240,422	280,614	372,960
Union of South Africa.....	4,460	5,370	6,290	4,371		12.8	12.4	21.5	17.0		60,890	66,763	80,383	90,175
Southern Rhodesia.....	223	325	318	273		18.3	20.1	14.7	16.9		4,079	6,623	6,847	4,043
Java and Madura.....	3,982	4,603	4,214	4,915	4,688	14.6	16.6	14.7	16.9		67,973	76,499	62,067	78,610
Australia.....	326	315	288			26.5	26.4	26.7			8,641	8,323	7,946	76,800
Total Southern Hemisphere countries reporting area and production, all years through 1930-31.....	17,266	19,876	21,766	21,448		20.4	19.9	19.9	24.3		362,722	395,072	434,339	520,960
Estimated Southern Hemisphere total.....	20,100	30,300	33,600	32,400	32,700						569,000	676,000	685,000	767,000
Total Northern and Southern Hemisphere countries reporting area and production, all years through 1930-31.....	153,590	157,897	158,405	160,489		25.0	23.7	23.9	20.5		3,838,157	3,744,976	3,784,386	3,296,683
Estimated world total, excluding Russia.....	170,800	189,400	184,500	167,200	162,900						4,307,000	4,301,000	4,310,000	3,825,000

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Northern Hemisphere harvest which takes place early in 1931.

1 Preliminary.

2 2-year average.

3 3-year average.

4 Average sown.

TABLE 51.—*Corn: World production, 1900-01 to 1931-3*

Crop year	Estimated world production, excluding Russia	Estimated European production, excluding Russia	Selected countries						
			United States	Argentina	Rumania	Italy	Brasil	Yugoslavia	Russia <sup>1</sup>
	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels
1900-01.....	3,593	445	2,505	99	85	88	-----	18	34
1901-02.....	2,782	497	1,614	84	117	100	-----	19	68
1902-03.....	3,686	391	2,619	149	68	71	-----	18	49
1903-04.....	3,554	459	2,347	175	80	89	-----	19	51
1904-05.....	3,505	279	2,529	141	20	90	-----	9	26
1905-06.....	3,904	403	2,749	195	59	97	-----	21	34
1906-07.....	4,095	533	2,898	72	131	93	-----	28	92
1907-08.....	3,761	441	2,512	136	58	88	-----	18	64
1908-09.....	3,789	465	2,545	177	79	96	-----	21	82
1909-10.....	3,946	499	2,572	175	70	102	-----	34	55
1910-11.....	4,152	564	2,886	28	104	104	-----	29	102
1911-12.....	3,895	502	2,531	296	111	95	-----	27	95
1912-13.....	4,448	547	3,125	197	104	101	-----	-----	94
1913-14.....	3,944	576	2,447	263	115	111	-----	-----	84
1914-15.....	4,190	569	2,673	325	103	105	-----	-----	<sup>2</sup> 90
1915-16.....	4,351	520	2,995	161	86	122	-----	-----	<sup>3</sup> 72
1916-17.....	3,777	389	2,567	59	-----	82	204	-----	<sup>4</sup> 62
1917-18.....	4,178	351	3,065	171	-----	83	95	-----	-----
1918-19.....	3,579	299	2,503	224	-----	77	87	-----	-----
1919-20.....	4,287	454	2,811	258	<sup>5</sup> 141	86	197	-----	-----
1920-21.....	4,689	519	3,209	230	182	89	186	<sup>6</sup> 101	46
1921-22.....	4,311	393	3,069	176	111	92	181	74	46
1922-23.....	4,241	424	2,906	176	120	77	202	90	81
1923-24.....	4,523	469	3,054	277	153	89	180	85	67
1924-25.....	3,879	589	2,309	186	155	106	162	149	91
1925-26.....	4,581	626	2,916	323	164	110	162	149	172
1926-27.....	4,476	653	2,692	321	230	118	148	134	181
1927-28.....	4,314	485	2,763	312	139	87	130	83	118
1928-29.....	4,301	384	2,819	240	109	65	189	72	127
1929-30.....	4,316	705	2,535	281	251	100	174	163	158
1930-31.....	3,825	610	2,060	373	178	118	-----	136	-----
1931-32 <sup>7</sup> .....	-----	643	2,557	-----	250	78	-----	127	-----

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which takes place early in 1931.

<sup>1</sup> Includes all Russian territory reporting for the years shown.

<sup>2</sup> Total Russian Empire exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.

<sup>3</sup> Exclusive of Russian Poland, Lithuania, parts of present Latvia and the Ukraine, and the Provinces of Batum and Elizabetpol in Transcaucasia.

<sup>4</sup> Beginning this year, estimates within present boundaries of the Union of Socialist Soviet Republics, exclusive of Turkestan, Transcaucasia, and the Far East, which territory in 1924-25 produced 26,048,000 bushels.

<sup>5</sup> Production in present boundaries beginning this year, therefore not comparable with earlier years.

<sup>6</sup> Preliminary.

TABLE 52.—*Corn: Monthly marketings, by farmers, as reported by about 8 500 mills and elevators, United States, 1921-22 to 1930-31*

Crop year	Percentage of year's receipts											
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1921-22	6.7	6.6	12.4	13.9	12.4	7.5	4.7	7.0	7.5	4.9	7.3	9.6
1922-23	8.2	8.7	13.6	10.7	11.0	6.6	3.3	6.1	6.4	6.8	7.5	9.1
1923-24	5.6	10.4	12.3	12.9	13.3	7.4	6.1	5.9	6.0	6.5	7.2	6.1
1924-25	7.0	11.1	13.0	13.6	9.5	8.1	6.3	7.8	4.3	6.6	6.2	6.5
1925-26	5.9	9.3	14.6	12.1	10.4	8.5	5.3	7.1	5.2	5.1	7.6	5.9
1926-27	10.1	9.1	12.9	11.7	10.8	6.9	4.8	6.1	9.1	5.7	6.2	6.6
1927-28	6.2	8.6	15.5	13.8	11.7	8.9	5.4	6.6	5.4	5.1	6.5	9.3
1928-29	6.6	12.5	16.7	12.9	11.5	7.4	3.8	4.3	7.3	5.8	5.5	5.4
1929-30	6.9	9.3	13.4	10.9	10.6	7.4	7.1	6.9	6.3	6.6	7.0	7.6
1930-31	7.5	9.3	13.0	10.0	9.9	8.2	7.7	5.5	7.5	7.4	8.2	5.8

Bureau of Agricultural Economics.

TABLE 53.—*Corn: Receipts at primary markets, 1921-22 to 1930-31*

Year beginning November	Chicago	St. Louis	Kansas City	Peoria	Omaha	Indianapolis	Total 10 markets <sup>1</sup>
	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.
1921-22	187,884	34,055	16,081	24,960	31,115	21,291	375,409
1922-23	116,711	30,263	15,595	21,284	23,308	18,839	255,590
1923-24	101,200	39,289	21,105	17,744	27,679	17,728	274,128
1924-25	80,700	23,135	21,470	21,234	13,345	17,613	202,504
1925-26	92,283	27,952	18,643	26,678	20,078	18,363	226,162
1926-27	91,880	21,039	14,767	23,292	20,482	19,977	217,881
1927-28	105,134	34,943	47,603	23,434	31,019	22,712	260,492
1928-29	95,060	38,517	34,536	27,390	16,276	25,519	268,600
1929-30	77,394	23,383	29,079	23,088	24,795	23,757	231,890
1930-31 <sup>2</sup>	59,365	13,014	25,929	8,842	17,438	21,925	170,039

Bureau of Agricultural Economics. Compiled from reports of Chicago Board of Trade, Duluth Board of Trade, Indianapolis Board of Trade, Kansas City Board of Trade, Omaha Grain Exchange, St. Louis Merchants Exchange, Milwaukee Chamber of Commerce, Minneapolis Chamber of Commerce, and Grain and Feed Journal.

<sup>1</sup> Includes also Milwaukee, Minneapolis, Duluth, and Toledo.<sup>2</sup> Preliminary.TABLE 54.—*Shelled corn: Classification of receipts graded by licensed inspectors at all inspection points, total of all classes under each grade, 1917-18 to 1930-31*

Year beginning November	Grade							
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	Sample	Total
	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars
1917-18	2,281	13,714	58,563	56,240	45,610	44,621	93,844	324,372
1918-19	12,661	34,727	40,872	41,491	28,832	16,061	19,638	194,262
1919-20	28,617	47,961	38,774	56,647	27,313	9,188	13,058	221,458
1920-21	68,550	88,875	64,237	63,081	21,176	9,420	8,738	324,077
1921-22	30,970	197,254	115,207	42,880	21,963	15,979	4,951	426,204
1922-23	21,580	141,563	98,932	24,262	4,270	3,526	3,711	297,844
1923-24	3,038	59,592	111,933	69,365	35,905	15,410	10,742	305,984
1924-25	7,883	80,883	56,542	24,431	31,370	17,252	12,345	204,706
1925-26	3,358	59,985	62,757	51,092	48,548	40,116	31,473	297,129
1926-27	1,616	34,390	57,931	48,217	50,195	46,180	31,171	269,700
1927-28	9,682	87,801	78,352	47,890	34,638	27,553	29,006	314,932
1928-29	25,809	92,258	73,331	93,367	40,594	10,400	7,247	343,033
1929-30	26,394	85,038	49,806	50,916	39,995	19,475	16,580	288,204
1930-31	18,176	67,781	70,928	45,629	14,745	5,262	3,745	226,266

Bureau of Agricultural Economics.

TABLE 55.—*Corn: Visible supply in United States,<sup>1</sup> 1922-23 to 1931-32*

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1922-23	8,806	11,072	16,780	21,658	27,529	28,742	22,339	6,734	3,366	2,373	1,687	2,062
1923-24	809	2,690	8,799	9,379	18,898	26,074	17,978	12,268	8,279	4,887	5,070	7,154
1924-25	8,097	7,563	18,573	27,571	32,292	32,727	23,379	17,140	13,094	6,093	6,524	5,470
1925-26	1,790	2,461	17,861	28,092	33,878	30,465	32,408	25,453	30,333	24,930	19,771	17,381
1926-27	22,258	28,699	34,712	38,792	45,103	47,244	30,621	29,961	34,427	30,205	22,312	23,687
1927-28	20,574	19,216	27,034	31,849	40,968	43,856	33,556	25,496	16,008	13,267	9,516	6,791
1928-29	2,030	6,419	17,146	26,042	33,302	34,150	25,687	14,259	13,054	8,751	5,417	4,197
1929-30	3,237	3,267	9,892	15,215	22,667	23,532	19,966	10,826	6,825	3,656	3,940	4,643
1930-31	4,379	6,964	16,390	16,757	18,961	20,447	18,270	11,412	7,815	8,183	8,846	5,362
1931-32	7,217	9,695										

Bureau of Agricultural Economics. Compiled from the Chicago Daily Trade Bulletin.

<sup>1</sup> Saturday nearest the 1st of each month.TABLE 56.—*Corn: Commercial stocks in store, 1926-27 to 1930-31*DOMESTIC CORN IN UNITED STATES<sup>1</sup>

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1926-27			36,019	40,670	47,515	49,759	39,010	31,224	36,268	31,782	23,324	24,913
1927-28	21,661	20,254	28,741	30,717	44,789	48,273	36,835	27,497	17,650	12,304	9,768	6,894
1928-29	2,032	6,353	18,565	28,797	36,927	37,744	28,863	15,951	13,740	9,086	6,340	4,421
1929-30	3,639	2,962	8,228	16,079	24,944	25,671	21,073	11,463	7,049	3,421	4,320	4,710
1930-31	4,550	7,332	17,190	17,383	20,127	22,174	19,697	12,837	7,279	8,363	9,068	5,587
1931-32	7,941	9,803										

## UNITED STATES CORN IN CANADA

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1926-27			2,147	1,715	1,788	1,403	1,781	1,452	1,184	1,706	1,188	2,010
1927-28	1,994	2,263	1,891	1,698	1,312	976	626	1,634	1,337	818	510	534
1928-29	252	268	580	737	601	356	1,759	1,602	911	746	490	987
1929-30	847	375	253	180	132	120	428	745	697	135	147	928
1930-31	750	723	571	481	428	388	476	995	176	196	557	500
1931-32	1,143	1,106										

Bureau of Agricultural Economics. Compiled from weekly reports to the grain, hay, and feed market news service. Data are for stocks on the Saturday nearest the 1st day of the month.

<sup>1</sup> Includes corn in store in public and private elevators in 42 important markets and also the corn afloat in vessels or barges in the harbors of lake and seaboard ports. Corn in transit either by rail or water, mill stocks, or small private stocks of corn intended only for local purposes, not included.TABLE 57.—*Corn: Estimated average price per bushel, received by producers, United States, 1922-23 to 1931-32*

Crop year	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Weighted average
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1922-23	62.2	64.3	67.6	70.2	72.5	75.3	79.6	84.0	85.8	87.0	87.0	86.2	75.0
1923-24	84.8	78.3	72.2	73.6	76.5	77.2	78.2	78.6	80.8	98.3	107.4	109.7	82.3
1924-25	108.9	99.6	105.6	112.0	114.5	112.1	103.8	107.5	111.0	104.4	106.5	98.8	107.3
1925-26	83.0	74.6	70.7	69.6	68.5	68.6	65.7	67.1	68.9	71.5	79.5	76.2	71.4
1926-27	73.5	66.0	64.5	64.3	66.5	65.2	65.6	73.0	88.9	92.4	97.7	95.3	74.1
1927-28	87.6	73.7	75.1	75.2	79.0	86.2	91.9	102.5	102.2	102.4	98.2	95.1	85.3
1928-29	84.7	75.4	76.1	80.2	86.8	88.7	87.5	86.2	86.9	91.2	95.9	97.2	84.5
1929-30	91.9	81.0	78.0	77.3	77.4	74.5	77.7	77.7	79.1	77.1	90.0	91.7	80.9
1930-31	81.9	66.3	64.9	61.7	58.6	57.5	57.7	55.3	53.8	54.0	60.8	43.2	59.5
1931-32	33.4	36.6	34.5										

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices reported on 1st of month and 1st of succeeding month, October, 1922-December, 1923.

## STATISTICS OF GRAINS

617

TABLE 58.—*Corn, including cornmeal in terms of grain: International trade, average 1925-26 to 1929-30, annual 1927-28 to 1930-31*

Country	Year beginning July									
	Average 1925-26 to 1929-30		1927-28		1928-29		1929-30		1930-31	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
<b>PRINCIPAL EXPORTING COUNTRIES</b>										
Argentina.....	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
Rumania.....	220,588	0	270,455	0	243,424	0	169,555	0	274,027	0
United States.....	30,906	21	39,503	(?)	3,712	(?)	31,080	(?)		
United States.....	23,233	1,637	19,409	5,463	41,874	490	10,281	196	3,313	1,737
Union of South Africa.....	19,446	376	17,843	300	18,769	129	18,361	52	23,547	30
Yugoslavia.....	8,534		871		534		18,436			
Russia.....	5,673		881							
Dutch East Indies.....	4,876	13	3,054	13	8,500	15	6,832	15	4,728	18
Hungary.....	4,043	508	2,028	688	802	1,124	6,109	350	628	3,275
Bulgaria.....	3,828		2,366		2,000		5,610		7,744	
Indo-China.....	3,554	0	2,979	0	4,363	31	5,400	82	5,004	0
Egypt.....	1,786	276	5,855	30	2,761	31	77	82	14	274
China.....	1,040	0	490	0	945	0	2,022	0	1,063	0
British India.....	227	0	1,059	0	29	0	6	0	2	0
<b>Total.....</b>	<b>327,734</b>	<b>2,831</b>	<b>375,693</b>	<b>6,494</b>	<b>327,713</b>	<b>1,789</b>	<b>272,740</b>	<b>998</b>	<b>320,075</b>	<b>5,344</b>
<b>PRINCIPAL IMPORTING COUNTRIES</b>										
United Kingdom.....	2,512	71,650	2,552	75,705	2,308	71,072	2,313	68,763	2,595	83,605
Netherlands.....	738	44,522	729	53,234	717	41,471	1,067	41,798	863	48,785
Germany.....	23	42,826	4	72,050	5	32,915	2	31,578	2	17,320
France.....	69	27,349	32	25,694	21	30,771	89	29,929	126	36,757
Belgium.....	1,080	24,268	1,121	27,317	1,096	22,630	1,023	21,895	1,585	27,232
Italy.....	42	23,942	24	21,135	16	40,971	26	27,240	16	25,257
Denmark.....	0	18,676	0	29,727	0	14,853	0	9,874	0	14,856
Irish Free State.....	124	16,159	152	16,847	142	17,536	61	16,607	63	20,672
Canada.....	58	13,645	41	15,151	98	14,815	84	14,010	42	9,819
Spain.....	0	13,008	0	12,561	0	12,450	0	9,915		
Czechoslovakia.....	5	12,088	8	13,980	1	10,579	2	9,035	3	16,808
Austria.....	20	6,593	13	6,136	21	5,338	30	7,160	17	8,214
Sweden.....		5,112		7,732		5,533		3,853		8,146
Switzerland.....	0	5,099	0	5,459	0	5,370	0	4,297	2	5,202
Norway.....		4,588		5,176		3,642		4,575		6,101
Cuba.....	0	2,315	0	2,068	0	1,155	0		0	
Mexico.....	4	2,108	0	1,119	0	393			0	3,122
Poland.....	22	2,008	8	3,017	15	1,144	8	636	0	862
Japan.....	0	1,702	0	1,172	0	1,588	0	2,532	0	2,776
Greece.....	0	886	0	1,005	0	1,145	0	380	0	522
Australia.....	91	602	143	143	272	22	3	81		
Tunis.....	17	424	1	1,145	17	1	13	1	15	647
Uruguay.....	561	4,406	3	527	2,364	274	394			
Algeria.....	14	214	25	240	14	106	11	61		
Finland.....	0	190	0	206	0	293	0	261	0	346
Estonia.....	0	66	0	23	0	292	0	0	0	0
<b>Total.....</b>	<b>5,379</b>	<b>340,442</b>	<b>4,856</b>	<b>398,439</b>	<b>7,107</b>	<b>336,959</b>	<b>5,076</b>	<b>304,481</b>	<b>5,329</b>	<b>337,109</b>

Bureau of Agricultural Economics, official sources except where otherwise noted. Maizena or malzena is included with "corn and corn meal."

1 Preliminary.

2 1 year only.

3 Monthly Crop Report and Agricultural Statistics.

4 4-year average.

5 3-year average.

6 Calendar year.

TABLE 59.—*Corn, No. 3, yellow: Weighted average price<sup>1</sup> per bushel of reported cash sales, Chicago, 1899-1900 to 1931-32*

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Weighted average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1899-1900.....	31	30	30	32	36	39	38	40	41	40	40	42	36
1900-01.....	37	35	36	37	39	42	43	42	48	56	56	56	43
1901-02.....	60	64	62	59	59	62	62	63	65	60	59	60	62
1902-03.....	53	46	43	43	41	41	46	49	51	53	51	45	47
1903-04.....	44	44	43	46	46	49	49	50	49	52	53	55	49
1904-05.....	48	43	42	44	47	48	50	55	57	54	53	53	48
1905-06.....	45	42	42	42	40	42	47	49	52	54	47	46	44
1906-07.....	43	42	41	45	43	44	52	53	54	57	64	65	50
1907-08.....	59	58	53	54	63	65	73	72	76	81	80	77	63
1908-09.....	63	59	64	65	66	69	73	75	72	70	69	59	65
1909-10.....	59	59	64	63	61	57	60	59	62	64	58	50	59
1910-11.....	49	45	45	45	45	50	54	55	63	65	67	73	53
1911-12.....	63	61	62	64	68	78	79	75	68	79	74	65	71
1912-13.....	52	46	46	48	49	55	57	60	62	74	75	70	58
1913-14.....	72	66	62	62	64	67	70	72	71	82	79	73	70
1914-15.....	67	64	71	74	72	75	77	74	78	81	74	65	70
1915-16.....	63	69	74	74	73	76	75	74	81	85	86	96	79
1916-17.....	98	92	98	100	109	140	159	170	199	206	210	203	111
1917-18.....	221	177	177	181	170	165	160	162	170	172	158	141	163
1918-19.....	133	145	143	127	153	162	174	178	192	195	155	141	162
1919-20.....	146	147	151	146	158	169	202	189	158	158	131	91	159
1920-21.....	77	75	65	63	62	57	60	63	60	56	53	45	62
1921-22.....	47	47	48	55	57	58	62	61	64	62	64	69	55
1922-23.....	71	73	70	72	73	79	82	84	88	88	89	104	73
1923-24.....	82	71	76	78	77	77	82	109	117	114	110	88	88
1924-25.....	111	120	124	122	117	105	115	113	108	102	91	82	106
1925-26.....	83	76	79	75	72	71	71	70	78	80	79	77	76
1926-27.....	71	75	74	73	68	71	87	99	102	109	97	84	87
1927-28.....	84	86	89	95	99	106	108	108	106	102	100	96	101
1928-29.....	84	83	93	94	94	90	87	91	99	101	101	95	92
1929-30.....	88	88	85	82	80	82	79	79	82	99	94	82	83
1930-31.....	71	69	65	61	60	58	58	57	46	42	38	60	60
1931-32.....	43	37											

Bureau of Agricultural Economics. Compiled from Chicago Daily Trade Bulletin.

<sup>1</sup>Average of daily prices weighted by car-lot sales.TABLE 60.—*Corn: Weighted average price<sup>1</sup> per bushel of reported cash sales of all classes and grades, six markets<sup>2</sup> combined, 1921-22 to 1931-32*

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Weighted average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1921-22.....	45.6	45.7	46.0	53.3	55.4	56.5	59.6	59.3	62.1	60.1	62.3	69.4	55.7
1922-23.....	70.8	71.6	69.2	71.6	72.4	79.0	82.1	83.1	85.6	86.4	88.3	100.3	77.4
1923-24.....	74.9	67.5	72.8	73.7	72.7	74.7	75.4	82.7	106.6	114.4	113.7	109.2	83.0
1924-25.....	108.3	114.4	112.9	103.6	103.5	99.0	111.9	109.7	105.3	101.3	89.1	80.8	106.0
1925-26.....	71.0	68.3	69.5	63.2	64.6	66.4	68.0	68.9	76.3	78.3	78.5	73.2	69.0
1926-27.....	67.3	65.9	65.2	62.7	60.9	67.0	83.0	91.5	96.7	104.2	92.2	79.9	75.8
1927-28.....	78.7	77.0	78.6	84.1	89.6	98.2	104.0	100.8	102.7	96.8	97.5	89.3	89.2
1928-29.....	79.8	78.4	87.1	80.5	89.0	86.9	84.6	82.7	95.1	99.9	100.0	95.9	85.5
1929-30.....	81.0	79.1	77.7	75.9	73.5	80.2	73.5	77.8	80.6	97.6	93.2	80.3	80.3
1930-31.....	67.8	64.1	61.0	57.2	56.8	56.8	54.4	55.8	56.9	46.7	42.4	38.0	56.9
1931-32.....	43.5	37.1											

Bureau of Agricultural Economics. Compiled from Chicago Daily Trade Bulletin, St. Louis Daily Market Reporter, Omaha Daily Price Current, Kansas City Grain Market Review, Minneapolis Daily Market Record, Cincinnati Daily Trade Bulletin. The prices in this table are comparable with prices paid to producers in that the latter are averages of the several prices reported which cover all classes and grades sold by producers.

<sup>1</sup>Average of daily prices weighted by car-lot sales.<sup>2</sup>Markets are Chicago, St. Louis, Omaha, Kansas City, Minneapolis, and Cincinnati (not included November, 1923-December, 1931).

TABLE 61.—*Corn, yellow, La Plata: Spot price per bushel of 56 pounds at Liverpool and Buenos Aires 1921-22 to 1931-32*

## LIVERPOOL

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1921-22.....	78	89	92	104	105	103	106	101	110	110	109	109	102
1922-23.....	96	100	99	104	105	109	114	110	102	94	99	97	102
1923-24.....	96	102	103	115	111	107	112	100	94	104	114	121	107
1924-25.....	121	122	131	129	114	111	120	128	127	133	120	103	121
1925-26.....	107	110	97	91	99	94	89	87	100	98	90	93	95
1926-27.....	95	92	89	93	87	88	91	93	91	98	97	96	93
1927-28.....	97	104	110	119	127	129	127	125	123	119	107	116	117
1928-29.....	123	120	124	127	124	120	107	104	113	113	107	103	116
1929-30.....	99	89	84	79	75	91	95	78	94	90	77	82	83
1930-31.....	52	54	48	19	53	62	57	50	47	41	41	40	60
1931-32.....	44	37											

## BUENOS AIRES

1921-22.....	61	63	63	73	79	77	75	71	78	78	76	74	72
1922-23.....	70	74	80	82	81	80	77	75	73	69	74	78	76
1923-24.....	81	79	78	82	77	67	63	64	63	65	68	105	79
1924-25.....	106	107	112	109	96	92	100	92	93	96	91	82	95
1925-26.....	84	86	73	73	66	70	63	68	68	70	65	60	71
1926-27.....	56	55	60	63	62	60	60	60	70	76	77	76	65
1927-28.....	75	83	86	97	102	95	90	91	90	86	91	94	91
1928-29.....	75	93	97	99	90	91	79	87	87	87	87	84	90
1929-30.....	74	79	65	62	62	62	60	56	54	56	51	43	61
1930-31.....	34	33	29	31	35	30	30	30	30	26	24	25	30
1931-32.....	32	28											

Bureau of Agricultural Economics. Compiled from International Yearbook of Agricultural Statistics, 1921; subsequently Broomhall's Corn Trade News and Review of the River Plate. Average of weekly quotations. Conversions of Liverpool prices at monthly average rate of exchange as given in Federal Reserve Bulletins to December, 1925, inclusive, subsequently at par of exchange, except that, beginning with September, 1931, the monthly average of current rates of exchange was used. Buenos Aires prices are averages of weekly quotations, converted at monthly average rate of exchange as given in the Federal Reserve Bulletin.

TABLE 62.—*Corn: Volume of trading in futures, contract markets, by markets and by months, 1930-31*

Month	Chicago Board of Trade	Chicago Open Board	Kansas City	St. Louis	Milwaukee	Minneapolis
	<i>1,000,000 bushels</i>	<i>1,000,000 bushels</i>	<i>1,000,000 bushels</i>	<i>1,000,000 bushels</i>	<i>1,000,000 bushels</i>	<i>1,000,000 bushels</i>
November.....	381	10	24	1 1/2	2	
December.....	568	26	21	1 1/2	4	
January.....	542	28	27	1 1/2	3	
February.....	427	20	21	1 1/2	2	4
March.....	330	17	18	1 1/2	2	3
April.....	342	11	23	1 1/2	2	2
May.....	317	10	17	1 1/2	2	1 1/2
June.....	244	8	10		2	1 1/2
July.....	353	13	13	1 1/2	1	1 1/2
August.....	344	14	12	1 1/2	2	
September.....	221	8	7	1 1/2	1	1 1/2
October.....	229	8	7	1 1/2	1	
Total.....	4,318	173	210	4	24	10

Grain Futures Administration.

TABLE 63.—*Corn: Volume of trading in futures on the Chicago Board of Trade by crop years, 1921-22 to 1930-31*

Crop year	Quantity	Crop year	Quantity	Crop year	Quantity
	<i>bushels</i>		<i>bushels</i>		<i>bushels</i>
1921-22.....	4,180,000,000	1925-26.....	3,863,000,000	1929-30.....	3,799,000,000
1922-23.....	4,535,000,000	1926-27.....	5,982,000,000	1930-31.....	4,318,000,000
1923-24.....	5,202,000,000	1927-28.....	6,589,000,000		
1924-25.....	6,363,000,000	1928-29.....	4,924,000,000		

Grain Futures Administration.

TABLE 64.—*Corn: Volume of trading in futures in all contract markets, by months, 1923-24 to 1930-31*

Months	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31
	1,000,000 bushels	1,000,000 bushels	1,000,000 bushels	1,000,000 bushels	1,000,000 bushels	1,000,000 bushels	1,000,000 bushels	1,000,000 bushels
November	394	557	317	353	473	457	261	418
December	285	707	514	395	681	420	199	649
January	457	710	302	261	511	690	196	600
February	338	677	236	288	608	373	252	474
March	442	810	317	429	733	416	328	370
April	323	670	292	313	745	466	283	380
May	283	510	237	692	699	526	290	346
June	426	566	343	921	567	475	322	265
July	565	463	448	575	553	520	498	381
August	740	394	439	713	616	453	611	373
September	695	442	368	536	372	296	433	233
October	678	335	340	588	467	269	461	246
Total	5,631	6,841	4,153	6,394	7,115	5,361	4,134	4,740

Grain Futures Administration.

TABLE 65.—*Oats: Acreage, production, value, exports, etc., United States, 1900-1931*

Year	Acreage harvested	Average yield per acre	Production	Price per bushel received by producers Dec 1.	Farm value, basis Dec. 1. farm price	Price per bushel at Chicago, year beginning Aug. 1.	Foreign trade, including meal, year beginning July			
							Domestic exports	Imports	Net exports	
									Total	Per centage of production
	1,000 acres	Bushels of 52 lb.	1,000 bushels	Cents	dollars	Cents	1,000 bushels	1,000 bushels	1,000 bushels	Percent
1900	30,290	30.2	913,600	25.4	232,074	26	42,269	32	42,237	4.6
1901	29,894	26.0	778,392	39.7	308,796	43	13,278	39	13,240	1.7
1902	30,573	34.5	1,053,489	30.6	322,423	34	8,382	150	8,233	.8
1903	30,866	28.2	869,350	34.0	295,232	38	1,961	184	1,877	.2
1904	31,353	32.2	1,008,981	31.1	313,488	32	8,395	56	8,339	.8
1905	32,072	34.0	1,090,236	28.9	314,868	31	45,435	40	45,395	4.4
1906	33,353	31.0	1,035,576	31.9	329,853	37	6,386	91	6,379	.6
1907	33,641	23.9	805,108	44.5	358,421	50	2,519	383	2,195	.3
1908	34,006	25.0	850,540	47.3	402,010	52	2,334	6,692	4,425	-----
1909	35,159	28.6	1,007,143	-----	-----	-----	-----	-----	-----	-----
1909	35,159	30.4	1,068,269	40.6	433,869	42	2,549	1,063	1,704	.2
1910	37,548	31.6	1,186,341	34.4	408,388	33	3,846	1,440	3,707	.3
1911	37,763	24.4	922,298	45.0	414,663	50	2,678	2,660	30	( <sup>5</sup> )
1912	37,917	37.4	1,418,337	31.9	452,469	35	36,455	765	35,695	2.5
1913	38,399	29.2	1,121,768	39.2	439,596	40	2,740	22,333	18,593	-----
1914	38,442	28.7	1,141,090	43.8	499,431	50	100,609	670	100,158	8.8
1915	40,996	37.8	1,549,080	36.1	559,506	41	98,960	730	98,648	6.4
1916	41,527	30.1	1,251,837	52.4	655,928	54	95,106	841	94,348	7.5
1917	43,553	36.6	1,592,740	66.6	1,061,474	71	125,091	2,915	122,273	7.7
1918	44,349	34.7	1,538,124	70.9	1,090,322	70	109,005	838	108,167	7.0
1919	37,991	37.8	1,055,183	-----	-----	-----	-----	-----	-----	-----
1919	39,599	27.9	1,108,426	70.2	777,064	80	43,436	6,077	37,365	3.4
1920	42,728	33.8	1,445,936	45.6	658,737	51	9,391	3,827	5,564	.4
1921	45,537	23.0	1,045,174	20.8	311,268	35	21,237	1,824	19,423	1.8
1922	40,824	28.5	1,147,720	39.0	447,277	41	25,413	840	25,087	2.2
1923	40,245	30.5	1,227,139	40.8	500,282	45	8,796	4,271	4,560	.4
1924	37,630	34.7	1,304,699	-----	-----	-----	-----	-----	-----	-----
1924	41,811	34.0	1,423,317	47.6	677,550	50	16,777	3,067	13,720	1.0
1925	44,250	31.9	1,410,194	37.4	527,847	41	39,687	2,013	39,585	2.8
1926	42,861	28.6	1,141,945	39.2	447,710	43	15,041	135	14,911	1.3
1927	40,326	27.1	1,092,550	44.3	454,253	55	9,823	233	9,688	.9
1928	40,079	32.9	1,317,640	40.3	530,587	44	10,251	426	15,325	1.2
1929	38,148	29.3	1,118,414	42.6	475,998	44	7,966	175	7,791	.7
1930	39,729	32.2	1,277,764	31.6	402,713	35	3,123	659	2,464	.2
1931 <sup>6</sup>	30,722	28.0	1,112,142	22.1	256,483	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text; italic figures are census returns. See 1927 Yearbook, p. 788, for data for earlier years.

<sup>1</sup>From Chicago Daily Trade Bulletin, averages of the daily cash quotations of No. 3 white oats weighted by car-lot sales.

<sup>2</sup>Compiled from Commerce and Navigation of the United States, 1900-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1926; January and June issues, 1927-1931; and official records of the Bureau of Foreign and Domestic Commerce. Oats—general imports, 1900-1931; oatmeal—general imports, 1900-1909; imports for consumption, 1910-1931.

<sup>3</sup>Total exports (domestic plus foreign) minus total imports.

<sup>4</sup>Net imports. Total imports minus total exports (domestic plus foreign).

<sup>5</sup>Less than 0.05 per cent.

<sup>6</sup>Preliminary.

## STATISTICS OF GRAINS

621

TABLE 66.—Oats: Acreage harvested and production, by States, average 1924-1928, annual 1928-1931

State and division	Acreage harvested					Production				
	Average, 1924-1928	1928	1929	1930	1931 <sup>1</sup>	Average, 1924-1928	1928	1929	1930	1931 <sup>1</sup>
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
Maine.....	125	114	120	120	118	4,640	3,876	4,548	4,740	3,776
New Hampshire.....	10	8	7	6	6	394	312	280	264	226
Vermont.....	71	58	55	56	61	2,217	1,595	1,705	1,848	1,952
Massachusetts.....	7	5	4	5	4	236	160	120	170	132
Rhode Island.....	2	2	2	2	2	71	56	70	70	62
Connecticut.....	11	8	7	8	8	813	196	210	256	232
New York.....	930	872	800	872	863	20,987	26,596	19,600	34,880	24,590
New Jersey.....	46	43	38	40	43	1,262	1,118	988	1,860	1,333
Pennsylvania.....	1,025	971	909	945	954	32,532	28,159	24,088	32,602	28,143
North Atlantic.....	2,226	2,081	1,942	2,054	2,059	71,658	62,068	51,609	76,190	60,454
Ohio.....	1,960	2,374	1,628	1,726	1,657	75,086	87,838	47,212	62,136	62,138
Indiana.....	1,998	2,337	1,872	1,968	1,966	62,818	86,469	53,352	57,211	61,330
Illinois.....	4,477	4,489	4,064	4,267	4,182	144,486	168,338	136,144	142,944	142,188
Michigan.....	1,537	1,534	1,265	1,354	1,435	51,200	51,389	35,546	48,744	43,768
Wisconsin.....	2,537	2,495	2,435	2,435	2,459	94,993	94,810	77,920	97,400	68,852
Minnesota.....	4,466	4,089	4,230	4,442	4,576	153,293	145,160	145,985	166,575	123,525
Iowa.....	6,188	6,150	6,043	6,303	6,026	223,326	226,160	215,131	233,211	186,806
Missouri.....	1,727	1,593	1,404	1,727	1,865	34,160	38,232	26,676	41,448	50,355
North Dakota.....	2,191	1,886	1,923	1,827	1,498	54,599	53,751	34,614	40,194	18,276
South Dakota.....	2,611	2,360	2,385	2,385	1,745	72,267	63,720	65,588	70,358	20,068
Nebraska.....	2,514	2,362	2,480	2,485	2,311	65,398	71,760	76,880	72,065	49,686
Kansas.....	1,414	1,249	1,150	1,334	1,494	30,487	31,725	24,160	36,635	41,085
North Central.....	33,620	32,948	30,879	32,251	31,213	1,062,113	1,129,352	939,148	1,068,971	868,086
Delaware.....	3	3	2	3	3	85	90	87	102	105
Maryland.....	53	55	47	49	67	1,508	1,512	1,316	1,470	2,010
Virginia.....	147	137	127	152	189	2,971	2,987	2,642	2,630	4,836
West Virginia.....	153	139	140	140	148	3,783	3,684	3,374	2,660	3,552
North Carolina.....	184	147	168	186	197	2,756	2,852	3,192	3,584	4,531
South Carolina.....	357	299	358	344	378	7,327	6,678	8,485	7,912	9,450
Georgia.....	285	212	289	246	332	5,028	4,134	5,809	5,043	7,968
Florida.....	10	9	8	8	9	131	135	112	120	162
South Atlantic.....	1,191	1,001	1,139	1,128	1,323	23,591	21,472	24,987	23,471	32,616
Kentucky.....	189	172	207	155	232	3,516	3,612	3,312	2,015	4,572
Tennessee.....	144	102	98	102	138	2,531	1,683	1,451	1,499	2,760
Alabama.....	97	58	98	90	153	1,625	928	1,960	1,440	3,396
Mississippi.....	38	26	34	20	50	707	520	748	360	1,325
Arkansas.....	161	94	92	94	160	2,889	1,786	1,748	1,739	4,180
Louisiana.....	14	15	16	13	26	312	388	400	260	754
Oklahoma.....	1,160	976	908	1,053	1,516	23,679	21,472	19,068	25,798	43,206
Texas.....	1,423	1,199	1,331	1,411	1,764	35,892	26,378	31,944	33,864	50,976
South Central.....	3,225	2,642	2,779	2,938	4,030	71,151	56,747	60,631	66,975	120,419
Montana.....	460	348	321	305	183	13,552	12,702	6,099	5,945	2,654
Idaho.....	137	127	140	133	116	4,635	4,699	4,830	4,921	3,944
Wyoming.....	139	147	165	140	98	3,815	3,969	4,042	3,150	1,764
Colorado.....	203	183	203	195	148	5,506	5,490	5,887	6,045	3,404
New Mexico.....	40	30	31	34	38	782	600	676	714	950
Arizona.....	11	9	7	10	12	309	297	175	300	280
Utah.....	51	47	49	46	43	1,811	1,782	1,877	1,840	1,290
Nevada.....	2	2	3	3	2	71	76	102	105	50
Washington.....	170	155	147	156	158	7,560	7,595	7,056	7,566	7,742
Oregon.....	278	263	253	240	228	7,879	7,843	9,108	8,890	7,136
California.....	106	106	90	96	67	2,696	2,968	2,187	2,688	1,273
Western.....	1,603	1,407	1,409	1,358	1,088	48,615	48,001	42,039	42,157	30,567
United States.....	41,856	40,079	38,148	39,729	39,722	1,277,127	1,317,640	1,118,414	1,277,764	1,112,142

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

<sup>1</sup> Preliminary.

TABLE 67.—Oats: Yield per acre, average 1919-1923 and annual 1926-1931, and estimated price per bushel December 1, average 1925-1929 and annual 1926-1931, by States

State and division	Yield per acre							Estimated price per bushel Dec. 1						
	Average 1919-1923	1926	1927	1928	1929	1930	1931	Average 1925-1929	1926	1927	1928	1929	1930	1931
	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
Maine.....	36.3	38.0	36.0	34.0	37.9	39.5	32.0	65	63	68	70	70	52	39
New Hampshire.....	37.7	41.0	39.0	39.0	40.0	44.0	38.0	67	65	70	65	70	54	42
Vermont.....	30.4	31.5	31.5	27.5	31.0	33.0	32.0	64	60	65	70	65	53	40
Massachusetts.....	31.8	34.0	28.0	32.0	30.0	34.0	33.0	69	70	70	70	70	52	40
Rhode Island.....	32.8	32.0	32.0	28.0	35.0	35.0	31.0	71	70	75	70	75	55	40
Connecticut.....	29.2	28.5	30.5	24.5	30.0	32.0	29.0	67	66	69	70	70	55	42
New York.....	20.8	30.5	32.5	30.5	24.5	40.0	28.5	54	50	55	54	58	44	33
New Jersey.....	26.6	29.0	31.0	26.0	28.0	34.0	31.0	53	50	53	53	57	48	30
Pennsylvania.....	30.2	32.0	32.0	29.0	26.5	34.5	29.5	53	49	54	53	57	48	32
North Atlantic.....	30.4	31.7	32.4	29.8	26.6	37.1	29.4	54.6	51.0	55.8	55.1	59.0	46.6	33.2
Ohio.....	35.0	40.5	32.0	37.0	29.0	36.0	37.5	42	39	45	42	45	35	23
Indiana.....	30.0	30.0	25.0	37.0	28.5	29.1	31.2	38	35	43	37	40	30	19
Illinois.....	32.0	26.5	25.5	37.5	33.5	33.5	34.0	38	35	43	39	40	29	20
Michigan.....	31.0	31.0	32.0	33.5	28.1	36.0	30.5	44	40	48	49	48	34	24
Wisconsin.....	35.2	34.5	35.0	38.0	32.0	40.0	28.0	42	40	47	43	44	33	27
Minnesota.....	32.6	27.0	26.0	35.5	34.5	37.5	27.0	35	34	40	35	37	25	21
Iowa.....	35.3	31.6	31.9	38.4	35.6	37.0	31.0	37	35	42	37	39	26	21
Missouri.....	20.1	17.0	15.0	24.0	19.0	24.0	27.0	44	42	47	42	47	39	22
North Dakota.....	23.1	17.5	21.0	28.5	18.0	22.0	12.2	31	33	35	30	32	20	19
South Dakota.....	28.0	11.0	28.5	27.0	27.5	29.5	11.5	33	36	36	33	34	21	22
Nebraska.....	27.2	20.0	26.5	30.0	31.0	29.0	21.5	38	40	40	38	38	28	24
Kansas.....	22.1	18.3	20.5	25.4	21.0	27.5	27.5	44	44	45	42	46	35	20
North Central.....	30.7	26.4	27.5	34.3	30.4	33.1	27.8	37.8	36.8	42.1	37.9	39.7	28.8	21.6
Delaware.....	26.7	28.0	29.0	30.0	28.5	34.0	35.0	62	59	68	60	57	50	30
Maryland.....	27.4	28.5	29.0	27.5	28.0	30.0	30.0	54	50	54	56	59	47	40
Virginia.....	19.2	22.5	19.5	21.8	20.8	17.3	25.6	66	63	64	64	67	60	34
West Virginia.....	23.7	26.0	22.5	26.5	24.1	19.0	24.0	62	59	64	63	64	59	35
North Carolina.....	15.8	14.0	14.5	16.0	19.0	19.0	23.0	74	69	72	73	75	68	38
South Carolina.....	21.7	22.0	20.5	22.0	23.7	23.0	25.0	80	67	75	88	80	74	39
Georgia.....	17.6	20.0	18.5	19.5	20.1	20.5	24.0	79	69	75	85	80	74	46
Florida.....	13.3	16.7	11.0	15.0	14.0	15.0	18.0	82	65	80	88	89	79	50
South Atlantic.....	19.9	21.1	19.6	21.5	21.9	20.8	24.7	72.8	65.0	70.6	76.3	74.7	68.1	39.5
Kentucky.....	17.8	19.5	15.5	21.0	16.0	13.0	21.0	58	53	60	57	59	53	29
Tennessee.....	17.0	20.5	14.0	16.5	15.6	14.7	20.0	60	55	60	60	62	53	33
Alabama.....	17.0	20.0	15.5	16.0	20.0	16.0	22.0	73	68	70	75	76	64	39
Mississippi.....	18.7	22.0	19.0	20.0	22.0	18.0	26.5	73	66	70	75	76	68	39
Arkansas.....	19.0	19.5	17.0	19.0	19.0	18.5	26.0	58	52	58	59	62	52	30
Louisiana.....	21.4	26.6	17.5	24.5	25.0	20.0	29.0	69	64	66	65	70	55	34
Oklahoma.....	21.0	23.0	16.5	22.0	21.0	24.5	28.5	45	37	44	47	48	38	19
Texas.....	25.0	34.0	22.0	22.0	24.0	24.0	34.0	50	38	47	51	51	42	20
South Central.....	22.1	27.1	19.2	21.5	21.8	22.8	29.8	50.2	40.3	48.0	51.1	52.3	42.0	21.5
Montana.....	28.2	26.0	39.0	36.5	19.0	19.5	14.5	48	53	44	41	51	31	33
Idaho.....	33.4	31.5	36.5	37.0	34.5	37.0	34.0	47	45	50	48	48	32	30
Wyoming.....	28.0	27.5	30.0	27.0	24.5	22.5	18.0	46	45	42	45	51	36	32
Colorado.....	27.9	26.0	29.0	30.0	29.0	31.0	23.0	47	44	48	45	48	30	30
New Mexico.....	20.8	24.0	22.0	20.0	21.3	21.0	25.0	59	56	56	60	60	55	36
Arizona.....	28.5	25.0	28.0	33.0	25.0	30.0	30.0	75	75	70	75	80	65	35
Utah.....	34.1	35.0	39.5	37.5	38.3	40.0	30.0	60	60	60	76	60	41	40
Nevada.....	36.8	28.0	39.0	38.0	34.0	35.0	25.0	65	62	66	66	70	52	46
Washington.....	45.4	44.0	43.5	49.0	43.0	43.5	49.0	55	53	56	55	59	36	32
Oregon.....	28.9	25.0	29.5	31.0	33.0	37.0	32.0	52	50	53	51	56	35	33
California.....	25.1	26.5	22.5	23.0	24.3	28.0	19.0	59	48	63	60	61	43	36
Western.....	30.4	28.6	34.3	34.1	29.8	31.0	28.1	50.9	50.4	49.5	48.5	53.9	35.9	32.5
United States.....	29.6	26.6	27.1	32.9	29.3	32.2	28.0	40.8	39.2	44.3	40.3	42.6	31.5	23.1

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

# STATISTICS OF GRAINS

623

TABLE 68.—Oats: World production, 1894-95 to 1931-32

Crop year	Estimated world production, excluding Russia and China	Estimated European production, excluding Russia	Selected countries							
			United States	Russia <sup>1</sup>	Germany	France	Canada	Poland	England and Wales	Argentina
	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels	Million bushels
1894-95	2,249	1,451	662	774	453	294			119	
1895-96	2,442	1,432	824	717	430	306			105	
1896-97	2,248	1,376	707	800	411	296			93	
1897-98	2,139	1,282	699	664	394	253			99	1
1898-99	2,389	1,511	731	688	465	322			102	1
1899-1900	2,503	1,462	796	995	474	308			99	2
1900-01	2,624	1,454	914	854	489	285			99	2
1901-02	2,344	1,415	778	624	486	255			91	2
1902-03	2,888	1,576	1,053	931	514	320			115	4
1903-04	2,829	1,649	869	800	542	344			109	3
1904-05	2,716	1,435	1,009	1,124	478	291			112	4
1905-06	2,823	1,460	1,090	937	461	306			99	6
1906-07	3,673	1,683	1,036	714	581	295			109	12
1907-08	2,861	1,768	805	921	630	353			121	34
1908-09	2,832	1,632	851	959	530	327	206		106	32
1909-10	3,415	1,863	1,068	1,163	629	383	376		104	36
1910-11	3,223	1,660	1,186	1,065	544	332	259		104	47
1911-12	3,135	1,683	922	876	531	349	388		96	69
1912-13	3,700	1,720	1,418	1,069	587	355	416		89	76
1913-14	3,580	1,906	1,122	1,251	669	357	430		91	43
1914-15	3,266	1,681	1,141	1,015	623	318	333		93	49
1915-16	3,594	1,401	1,549	1,897	412	289	494		101	75
1916-17	3,259	1,469	1,252	1,845	484	277	436		102	32
1917-18	3,217	1,047	1,593	761	280	220	428		106	69
1918-19	3,216	1,117	1,538		302	181	453		141	34
1919-20	3,039	1,318	1,184		310	180	419	76	110	31
1920-21	3,645	1,476	1,496	486	352	291	564	129	103	51
1921-22	3,102	1,451	1,078	359	345	244	453	92	100	31
1922-23	3,341	1,471	1,216	409	277	258	522	110	88	56
1923-24	3,791	1,719	1,306	406	421	337	599	153	95	76
1924-25	3,652	1,572	1,503	603	390	306	431	106	105	53
1925-26	3,790	1,709	1,488	838	385	328	427	144	97	80
1926-27	3,639	1,843	1,247	1,071	436	364	407	134	104	66
1927-28	3,526	1,748	1,183	917	437	343	467	147	94	52
1928-29	3,950	1,879	1,439	1,135	482	340	480	172	101	65
1929-30	3,647	2,060	1,118	1,144	509	373	301	203	107	68
1930-31	3,600	1,728	1,278		390	303	450	162	94	53
1931-32 <sup>2</sup>	3,350	1,735	1,112		427	344	349	165	87	65

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends in 1931.

<sup>1</sup> Includes all Russian territory reporting for the years shown.

<sup>2</sup> Total Russian Empire, exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.

<sup>3</sup> Exclusive of Russian Poland, Lithuania, parts of present Latvia and the Ukraine, and the Provinces of Batum and Elizabetpol, in Transcaucasia.

<sup>4</sup> Beginning this year, estimates for the present territory of the Union of Socialist Soviet Republics, exclusive of Turkestan, Transcaucasia, and the Far East, which territory in 1924-25 produced 20,248,000 bushels.

<sup>5</sup> Beginning with this year postwar boundaries and therefore not comparable with earlier years.

<sup>6</sup> Preliminary.

TABLE 69.—Oats: Acreage, yield per acre, and production in specified countries, average 1931-32 to 1935-36, annual 1928-29 to 1931-32

Country	Acreage			Yield per acre					Production						
	Average, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32	Average, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32	Average, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32
NORTHERN HEMISPHERE															
North America:	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	Bushels	Bushels	Bushels	Bushels	Bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
Canada:	14,385	13,187	12,470	13,250	12,871	33.4	30.6	29.3	33.9	27.1	480,570	449,516	300,510	449,586	348,795
United States:	42,860	41,784	38,148	39,729	39,722	30.8	34.5	28.3	32.2	28.0	1,318,021	1,489,407	1,118,414	1,277,704	1,112,142
Total:	57,435	54,871	50,618	52,979	52,593	31.4	35.0	28.0	32.6	27.8	1,804,591	1,919,920	1,418,980	1,727,359	1,460,937
Europe:															
England and Wales:	2,970	1,702	1,851	1,778	1,652	47.5	57.3	57.8	52.8	52.5	90,796	101,017	107,240	93,902	86,798
Scotland:	796	649	660	644	623	49.0	68.7	72.5	52.5	52.1	47,585	49,250	52,287	45,290	43,540
Ireland:	344	307	314	307	290	54.0	63.0	63.9	68.2	68.0	18,382	19,310	20,072	19,408	18,433
Northern Ireland:	274	246	239	239	237	41.6	51.5	50.8	57.0	44.0	11,406	12,080	12,072	10,493	10,433
Norway:	1,807	1,713	1,748	1,628	1,589	41.7	47.0	46.2	48.6	42.4	75,374	80,471	80,067	78,058	67,310
Sweden:	1,118	999	979	968	935	54.2	73.0	72.8	71.7	69.3	60,642	72,960	71,276	68,725	64,980
Denmark:	380	377	396	370	386	51.4	65.8	65.1	55.3	51.8	24,801	24,801	24,776	18,480	18,480
Netherlands:	656	607	744	674	728	62.4	72.7	69.2	66.7	65.7	40,964	48,457	51,457	38,223	40,581
Belgium:	70	71	77	70	70	30.4	42.3	47.0	39.3	39.3	2,130	3,011	3,517	2,760	2,749
Luxembourg:	8,510	8,557	8,510	8,557	8,038	35.3	39.3	43.8	35.4	35.8	300,569	340,252	373,142	302,747	344,220
France:	8,621	8,657	8,510	8,557	8,038	35.3	39.3	43.8	35.4	35.8	300,569	340,252	373,142	302,747	344,220
Spain:	1,623	1,956	1,839	1,940	1,860	22.3	13.2	12.9	24.9	25.8	36,175	35,009	46,812	40,985	41,670
Portugal:	1,589	1,481	1,432	1,429	1,371	11.4	10.5	12.9	18.1	18.1	17,767	16,412	15,871	16,828	14,657
Italy:	51	51	50	49	45	51.7	37.6	37.9	50.2	50.1	2,788	2,928	2,894	2,480	2,659
Switzerland:	8,246	8,090	8,783	8,499	8,310	44.1	55.4	57.8	45.9	45.9	363,272	481,960	508,033	398,688	427,479
Germany:	2,089	2,069	2,143	2,049	2,116	30.5	42.8	43.0	35.8	31.9	62,029	98,065	102,927	90,100	82,863
Austria:	785	652	745	643	612	28.8	47.4	48.0	44.0	38.2	22,644	27,529	28,292	17,988	12,686
Czechoslovakia:	923	913	953	1,038	983	22.4	27.6	25.4	18.9	18.6	20,644	25,286	24,166	19,684	18,242
Hungary:	206	277	253	259	295	18.9	16.5	16.5	16.7	16.7	4,187	5,246	4,179	5,991	6,614
Yugoslavia:	362	298	338	345	295	19.6	24.3	22.1	22.1	23.2	7,100	6,139	9,434	7,616	8,605
Bulgaria:	3,133	2,769	2,987	2,893	2,153	20.6	24.3	31.2	29.7	29.7	62,819	76,546	93,647	76,678	46,159
Rumania:	4,446	6,036	5,415	5,404	5,307	27.2	34.2	37.6	33.9	30.7	120,813	172,076	203,450	161,736	104,656
Poland:	842	6,712	845	855	795	27.4	25.8	35.8	31.4	32.7	23,078	18,377	30,233	26,871	16,427
Lithuania:	740	590	740	700	700	24.6	17.0	31.8	29.8	31.0	18,206	10,037	23,483	23,537	24,631
Latvia:	380	390	371	368	367	23.3	21.8	27.7	26.5	26.5	8,505	6,817	10,277	10,870	10,723
Estonia:	1,058	1,140	1,074	1,137	1,149	32.0	34.4	33.1	36.5	36.5	34,529	39,254	35,498	41,458	45,886

# STATISTICS OF GRAINS

625

Russia, European and Asiatic.....	25,776	42,640	46,621	44,268	42,497	20.3	28.6	24.5	38.4	39.4	522,905	1,133,369	1,144,325	-----
Total Europe reporting area and production, all years.....	42,401	42,593	43,824	42,688	42,070	35.8	42.4	45.2	38.4	39.4	1,518,790	1,804,802	1,981,632	1,659,624
Estimated European total, excluding Russia.....	44,300	44,400	45,800	44,700	43,700	-----	-----	-----	-----	-----	1,584,000	1,870,000	2,060,000	1,735,000
<b>Africa:</b>														
Morocco.....	85	74	116	108	78	18.4	24.0	20.4	22.9	32.3	645	1,775	3,413	2,357
Algeria.....	605	601	639	635	542	21.0	28.1	23.1	26.1	20.1	12,718	14,492	14,785	16,501
Tunisia.....	126	104	133	124	99	18.4	28.5	23.9	16.7	32.7	2,439	3,066	3,445	2,067
Total.....	766	779	868	862	714	20.6	24.8	24.4	21.3	23.1	15,797	19,333	21,643	20,855
<b>Asia:</b>														
Turkey.....	216	307	426	874	-----	447.5	17.6	22.6	28.7	-----	411,891	5,402	10,089	10,000
Syria and Lebanon.....	28	27	28	28	27	16.7	19.3	25.6	19.5	21.1	1,435	2,523	1,718	1,515
Japan.....	278	285	259	287	-----	38.0	40.4	38.2	42.3	-----	10,847	11,513	11,513	12,353
China.....	276	265	270	270	-----	16.5	15.3	16.2	16.0	-----	4,545	4,061	4,370	4,311
Total Northern Hemisphere reporting area and production, all years.....	100,028	98,270	95,367	96,816	95,404	83.2	88.1	85.9	85.1	82.9	3,339,613	3,744,477	3,422,923	3,396,736
Estimated Northern Hemisphere total excluding Russia and China.....	103,300	101,000	98,200	99,600	97,900	-----	-----	-----	-----	-----	3,434,000	3,841,000	3,528,000	3,242,000
<b>SOUTHERN HEMISPHERE</b>														
Brazil.....	16	15	297	193	166	30.1	33.4	35.0	26.5	-----	482	501	10,400	5,109
Chile.....	106	220	207	193	166	37.3	32.4	18.8	7.7	13.6	3,094	7,129	3,877	1,370
Uruguay.....	120	132	206	214	214	18.1	19.2	31.6	25.7	18.9	2,196	2,329	68,271	3,132
Argentina.....	1,824	2,169	2,160	2,051	1,847	32.5	20.6	31.6	25.7	18.9	59,286	65,172	68,283	65,449
Union of South Africa.....	645	624	688	535	535	10.3	12.6	15.0	11.1	-----	6,624	7,844	10,289	5,033
Australia.....	1,000	1,046	1,316	1,126	-----	18.0	16.9	11.9	18.4	-----	19,010	17,686	16,680	20,690
New Zealand.....	125	73	68	74	-----	48.0	51.2	53.8	58.3	-----	5,996	3,736	5,650	4,314
Total Northern and Southern Hemisphere countries reporting area and production, all years.....	102,572	100,901	97,733	99,046	99,088	33.2	37.9	35.8	34.9	32.4	3,401,065	3,812,178	3,495,093	3,453,823
Estimated world total, excluding Russia and China.....	107,300	105,400	103,200	103,800	102,600	-----	-----	-----	-----	-----	3,535,000	3,960,000	3,647,000	3,600,000

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

1 Preliminary.

2 2-year average.

3 1 year only.

4 4-year average.

5 Acreage sown.

6 Yield per acre sown.

TABLE 70.—*Oats: Monthly marketings by farmers, as reported by about 3,500 mills and elevators, United States, 1921-22 to 1930-31*

Crop year	Percentage of year's receipts											
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1921-22	16.5	11.8	7.9	5.3	6.1	7.3	6.9	5.6	4.3	7.2	6.0	15.1
1922-23	15.7	11.9	10.1	7.8	8.6	7.4	7.1	6.5	4.7	5.4	5.9	8.9
1923-24	17.7	14.1	11.5	6.8	7.6	7.7	7.9	5.2	4.8	4.8	4.9	7.0
1924-25	20.7	17.8	11.5	5.6	4.8	4.7	3.5	3.9	3.9	5.0	4.6	14.0
1925-26	22.2	13.2	9.3	6.3	6.8	6.1	6.2	5.2	4.2	4.5	5.6	10.4
1926-27	21.8	11.7	8.7	5.8	6.4	6.1	6.7	5.6	4.4	5.5	6.4	10.9
1927-28	22.7	13.8	9.7	5.7	6.7	6.3	6.3	6.2	3.8	4.1	5.4	9.3
1928-29	23.4	13.8	10.2	5.8	7.4	5.6	6.5	5.1	4.9	4.3	6.2	6.8
1929-30	30.9	13.0	8.2	4.6	5.1	3.8	5.1	4.5	5.1	4.3	4.9	10.5
1930-31	29.1	13.1	8.4	4.2	4.5	4.1	5.1	4.1	4.8	3.5	5.4	13.7

Bureau of Agricultural Economics.

TABLE 71.—*Oats: Receipts at primary markets, 1921-22 to 1930-31*

Year beginning August	Chicago	Minneapolis	St. Louis	Milwaukee	Peoria	Omaha	Total 10 markets <sup>1</sup>
	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.
1921-22	78,042	33,072	26,118	23,612	13,485	10,964	215,715
1922-23	85,169	25,706	33,261	22,780	15,947	14,385	224,104
1923-24	69,902	29,259	35,791	20,496	13,406	18,355	219,972
1924-25	74,698	54,886	34,724	20,542	11,164	16,023	261,032
1925-26	50,660	36,616	28,662	14,165	9,749	13,124	207,723
1926-27	49,420	18,170	19,746	14,857	8,256	6,636	140,081
1927-28	53,609	27,313	19,394	10,506	8,906	8,858	155,307
1928-29	40,954	20,827	24,421	7,534	7,305	6,832	138,058
1929-30	34,691	21,534	18,263	12,524	7,718	9,280	133,251
1930-31 <sup>2</sup>	21,825	17,061	9,741	8,290	4,581	4,550	93,770

Bureau of Agricultural Economics. Compiled from reports of Chicago Board of Trade, Duluth Board of Trade, Indianapolis Board of Trade, Kansas City Board of Trade, Omaha Grain Exchange, St. Louis Merchants Exchange, Milwaukee Chamber of Commerce, Minneapolis Chamber of Commerce, and Grain and Feed Journal.

<sup>1</sup> Includes also Duluth, Toledo, Kansas City, and Indianapolis.<sup>2</sup> Preliminary.TABLE 72.—*Oats: Classification of receipts granted by licensed inspectors, all inspection points, total of all classes under each grade, 1919-20 to 1930-31*

Year beginning August	Grade					
	No. 1	No. 2	No. 3	No. 4	Sample	Total
	Cars	Cars	Cars	Cars	Cars	Cars
1919-20	5,052	51,006	94,497	15,805	3,537	170,497
1920-21	8,803	60,169	73,072	14,766	6,831	163,641
1921-22	2,519	31,643	105,103	31,774	6,664	177,703
1922-23	2,548	47,348	95,984	17,004	4,640	167,524
1923-24	2,724	41,530	90,759	22,643	11,307	168,963
1924-25	1,489	33,631	110,877	24,580	14,863	184,930
1925-26	2,197	53,587	75,634	17,989	6,260	155,667
1926-27	1,465	19,692	49,581	28,548	17,695	116,981
1927-28	2,838	29,106	64,444	19,397	5,728	121,513
1928-29	4,408	14,144	77,823	20,684	9,305	126,364
1929-30	4,106	26,053	71,757	11,822	3,097	116,835
1930-31	10,344	36,939	35,186	8,137	983	91,589

Bureau of Agricultural Economics.

## STATISTICS OF GRAINS

627

TABLE 73.—Oats: Visible supply in United States,<sup>1</sup> 1922-23 to 1931-32

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1922-23	36,667	38,355	35,968	34,077	32,940	32,391	30,861	27,683	24,044	21,632	18,514	5,523
1923-24	5,477	10,111	16,514	20,438	18,688	19,940	17,539	17,741	16,715	10,656	6,720	5,264
1924-25	8,086	11,403	52,715	66,564	67,265	72,128	73,870	72,389	61,104	43,082	35,331	33,263
1925-26	26,298	50,708	65,818	64,926	64,251	63,187	63,076	58,974	62,023	47,025	38,976	37,900
1926-27	33,772	43,671	48,450	48,097	48,288	44,927	45,422	43,454	37,145	29,573	20,802	17,790
1927-28	12,001	21,501	24,931	23,857	22,252	21,907	20,350	18,791	15,746	11,168	7,068	3,225
1928-29	2,377	13,378	15,193	14,472	13,295	13,968	13,611	14,898	12,609	10,276	9,280	7,430
1929-30	7,626	23,488	23,321	30,155	27,534	26,496	24,471	21,673	18,349	16,242	12,652	10,875
1930-31	8,467	23,230	30,495	30,515	28,269	28,226	24,565	21,229	16,966	13,152	9,439	7,242
1931-32	6,489	13,849	16,939	17,269	16,898							

Bureau of Agricultural Economics. Compiled from the Chicago Daily Trade Bulletin.

<sup>1</sup> Saturday nearest the 1st of each month.

TABLE 74.—Oats: Commercial stocks in store, 1926-27 to 1931-32

DOMESTIC OATS IN UNITED STATES<sup>1</sup>

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1926-27						47,123	47,421	45,105	38,481	30,513	22,553	17,686
1927-28	11,888	23,224	26,513	25,682	24,784	23,815	20,006	21,127	16,803	11,687	7,171	3,338
1928-29	1,939	15,992	17,561	16,900	15,399	17,314	16,219	16,800	14,003	11,493	10,591	8,592
1929-30	8,668	24,318	28,597	32,762	30,044	20,568	26,097	22,937	19,484	16,519	13,247	11,028
1930-31	9,102	25,844	32,904	33,265	30,504	30,896	26,770	23,029	19,055	13,930	9,681	8,042
1931-32	8,021	15,013	17,372	18,180	18,161							

## UNITED STATES OATS IN CANADA

1926-27						352	247	218	164	635	1,432	1,759
1927-28	1,253	1,238	1,435	1,110	825	670	563	438	216	57	239	60
1928-29	4	978	2,326	1,031	847	644	494	424	309	716	529	345
1929-30	334	2,177	4,711	4,435	4,410	3,735	3,236	2,832	2,407	1,934	1,680	936
1930-31	1,106	2,679	2,524	2,425	2,108	1,475	1,110	834	640	321	936	584
1931-32	207	110	199	230	467							

CANADIAN OATS IN UNITED STATES<sup>1</sup>

1926-27						228	228	171	66	117	321	19
1927-28	24	26	0	139	296	609	312	247	117	21	199	122
1928-29	101	123	141	211	711	900	704	801	516	722	577	377
1929-30	341	341	233	426	670	699	634	615	488	330	264	91
1930-31	146	21	55	27	7	255	167	3	17	78	238	73
1931-32	13	41	41	41	32							

Bureau of Agricultural Economics. Compiled from weekly reports to the Grain, Hay, and Feed Market News Service. Data are for stocks on the Saturday nearest the 1st day of the month.

<sup>1</sup> Includes oats in store in public and private elevators in 43 important markets and also the oats afloat in vessels or barges in the harbors of lake and seaboard ports. Oats in transit either by rail or water, mill stocks, or small private stocks of oats intended only for local purposes, not included.<sup>2</sup> Includes oats stored at lake and seaboard ports, exclusive of oats in transit on lakes and canals.

TABLE 75.—Oats including oatmeal in terms of grain: International trade, average 1925-26 to 1929-30, annual 1927-28 to 1930-31

Country	Year beginning July									
	Average 1925-26-1929-30		1927-28		1928-29		1929-30		1930-31 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
<b>PRINCIPAL EXPORT- ING COUNTRIES</b>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>
Argentina.....	29,280	<sup>2</sup> 91	23,831	80	25,690	—	20,181	—	45,036	123
Germany.....	20,070	15,581	13,318	16,522	25,833	9,981	47,940	3,964	1,752	2,751
United States.....	17,754	207	9,823	202	16,251	399	7,068	152	3,123	638
Canada.....	16,656	2,899	10,194	2,770	10,532	3,452	4,600	3,980	10,336	714
Chile.....	3,861	—	4,833	—	2,761	—	1,925	—	8,512	—
Czechoslovakia.....	3,676	1,260	5,862	530	4,453	300	4,424	402	2,408	70
Irish Free State.....	3,305	1,559	5,740	560	2,404	1,271	2,141	1,279	847	1,819
Rumania.....	3,302	2	2,611	1	<sup>3</sup> 936	<sup>3</sup> 0	<sup>3</sup> 4,974	<sup>3</sup> 0	<sup>3</sup> 6,201	<sup>3</sup> 0
Poland.....	2,713	1,499	658	1,619	267	1,465	5,667	257	858	55
Hungary.....	2,134	2	1,199	1	790	1	2,492	1	73	363
Russia.....	<sup>4</sup> 2,078	0	3,251	0	48	0	—	—	—	—
Algeria.....	1,784	593	1,665	498	3,206	308	1,351	506	—	—
Tunis.....	1,558	81	414	282	2,242	0	2,614	0	1,901	24
Yugoslavia <sup>5</sup> .....	495	<sup>2</sup> 48	493	25	325	71	28	48	6	380
<b>Total.....</b>	<b>108,644</b>	<b>23,817</b>	<b>88,292</b>	<b>23,090</b>	<b>104,738</b>	<b>17,226</b>	<b>106,303</b>	<b>10,589</b>	<b>79,053</b>	<b>6,937</b>
<b>PRINCIPAL IMPORTING COUNTRIES</b>										
United Kingdom.....	1,170	30,339	713	31,309	1,020	25,862	958	33,196	1,237	35,576
Switzerland.....	5	10,936	4	9,770	5	10,741	6	13,613	13	14,263
Belgium.....	46	8,210	30	6,607	15	9,357	40	8,894	49	10,794
Netherlands.....	412	7,851	260	6,938	773	6,486	576	11,902	1,173	10,659
Italy.....	9	7,016	1	9,064	1	5,429	2	5,119	1	12,001
France.....	643	6,598	1,735	2,490	396	7,292	234	5,792	76	6,509
Austria.....	8	6,092	12	5,303	6	5,774	5	5,684	13	6,589
Denmark.....	217	3,255	123	2,155	326	2,574	62	3,783	65	4,586
Sweden.....	902	2,955	536	2,215	720	4,172	490	3,553	451	3,779
Finland.....	25	1,891	92	990	13	3,504	0	2,155	24	963
Cuba.....	0	<sup>4</sup> 1,215	0	1,051	0	987	—	—	—	—
Latvia <sup>6</sup> .....	110	1,127	3	1,223	0	2,883	512	309	14	179
Norway.....	8	714	5	683	9	336	10	556	13	58
Estonia.....	0	663	0	651	0	1,356	0	339	0	534
Greece.....	0	<sup>4</sup> 348	0	200	0	108	0	600	0	3
Australia.....	155	276	111	670	144	69	184	38	<sup>3</sup> 234	<sup>3</sup> 7
Union of South Africa.....	148	160	134	141	143	120	169	107	84	104
Japan <sup>6</sup> .....	0	96	0	6	0	76	0	100	—	—
<b>Total.....</b>	<b>3,893</b>	<b>89,773</b>	<b>3,759</b>	<b>81,466</b>	<b>3,751</b>	<b>87,126</b>	<b>3,245</b>	<b>104,150</b>	<b>3,447</b>	<b>106,604</b>

Bureau of Agricultural Economics. Official sources except where otherwise noted.

<sup>1</sup> Preliminary.<sup>2</sup> 3-year average.<sup>3</sup> Monthly Crop Report and Agricultural Statistics.<sup>4</sup> 4-year average.<sup>5</sup> Calendar year.<sup>6</sup> Year beginning August 1, International Yearbook of Agricultural Statistics.

# STATISTICS OF GRAINS

629

TABLE 76.—Oats: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32

Crop Year	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weight- ed aver- age
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1922-23	33.6	33.4	36.4	38.8	40.3	41.5	42.4	43.5	44.8	45.3	43.7	40.2	39.0
1923-24	37.6	38.0	39.4	40.8	42.6	43.4	45.4	46.2	46.5	46.3	46.8	49.4	42.6
1924-25	49.1	47.1	48.9	47.4	50.6	54.0	53.4	49.7	44.7	45.4	45.3	45.3	48.3
1925-26	40.7	38.1	37.2	37.6	39.1	40.0	39.2	35.8	39.4	39.5	38.9	37.7	39.0
1926-27	37.9	35.6	39.0	39.8	41.1	42.6	43.4	43.4	43.2	45.4	48.0	46.3	41.2
1927-28	44.4	43.9	44.6	45.1	48.1	49.3	51.3	54.5	56.9	62.0	61.4	56.2	48.9
1928-29	38.4	36.7	39.0	39.8	42.5	43.7	47.0	46.6	45.8	44.6	42.5	42.9	41.1
1929-30	42.7	44.1	44.8	43.1	43.6	43.1	43.0	41.4	42.4	40.9	39.3	33.1	41.9
1930-31	35.7	36.1	34.7	31.5	32.3	31.1	30.7	30.1	30.2	28.6	26.1	23.3	31.9
1931-32	19.8	20.0	20.1	23.2	23.0								

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices reported on 1st of month and 1st of succeeding month, August, 1922-December, 1923.

TABLE 77.—Oats, No. 3, white: Weighted average price<sup>1</sup> per bushel of reported cash sales, Chicago, 1909-10 to 1931-32

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Weight- ed aver- age
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1909-10	38	39	40	40	44	48	47	44	42	40	39	41	42
1910-11	35	34	32	32	32	33	31	31	32	34	39	44	33
1911-12	41	45	47	48	47	50	52	53	57	55	53	49	50
1912-13	33	33	33	32	33	33	33	32	35	38	40	40	35
1913-14	42	43	40	40	40	39	39	39	39	40	40	37	40
1914-15	42	48	46	48	49	53	58	57	57	54	49	53	50
1915-16	41	34	36	36	42	48	45	42	44	43	39	41	41
1916-17	44	46	49	55	53	57	56	61	69	70	67	78	54
1917-18	61	60	60	65	77	82	89	93	89	77	77	77	71
1918-19	70	72	69	72	72	65	58	63	70	69	70	78	70
1919-20	73	68	70	73	82	86	86	93	101	109	113	91	80
1920-21	70	62	54	51	48	44	42	42	36	39	37	34	51
1921-22	32	35	31	33	34	34	36	36	38	38	37	36	35
1922-23	32	38	42	43	44	43	44	45	46	45	43	40	41
1923-24	38	40	43	43	44	46	48	47	48	48	51	54	45
1924-25	50	48	50	50	58	58	53	48	42	45	49	44	50
1925-26	41	39	39	40	42	42	41	40	42	41	40	42	41
1926-27	38	38	44	42	46	46	43	44	45	50	49	45	43
1927-28	47	47	48	49	54	55	56	59	63	67	68	56	55
1928-29	38	41	42	44	46	50	50	48	48	45	45	47	44
1929-30	43	48	47	45	45	45	44	43	43	41	38	35	44
1930-31	89	38	36	33	34	32	32	31	30	28	27	23	35
1931-32	21	22	23	26	25								

Bureau of Agricultural Economics. Compiled from the Chicago Daily Trade Bulletin. Data for 1899-1908 available in 1924 Yearbook, p. 628, Table 94.

<sup>1</sup> Average of daily prices weighted by car-lot sales.

TABLE 78.—*Barley: Acreage, production, value, exports, etc., United States, 1900-1931*

Year	Acreage harvested	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value, basis Dec. 1 farm price	Price per bushel at Chicago, year beginning August <sup>1</sup>	Foreign trade, including barley, flour, and malt, year beginning July <sup>2</sup>			
							Domestic exports	Imports	Net exports <sup>3</sup>	
									Total	Percentage of production
	1,000 acres	Bushels of 48 lbs.	1,000 bushels	Cents	1,000 dollars	Cents	1,000 bushels	1,000 bushels	1,000 bushels	Per cent
1900.....	4,545	21.1	96,041	40.5	38,896	45.6	6,619	175	6,445	6.7
1901.....	4,742	25.7	121,784	45.2	55,068	64	9,079	00	9,019	7.4
1902.....	5,126	29.1	149,889	45.5	67,944	56	8,745	59	8,686	5.8
1903.....	5,563	26.4	146,864	45.4	66,700	56	11,280	94	11,187	7.6
1904.....	5,912	27.4	162,105	41.6	67,427	49	11,105	84	11,021	6.8
1905.....	6,230	27.2	170,089	39.4	66,959	50	18,431	20	18,410	10.8
1906.....	6,730	28.6	192,270	41.6	80,069	61	8,616	41	8,632	4.5
1907.....	6,941	24.5	170,008	66.3	112,675	84	4,554	202	4,870	2.6
1908.....	7,264	25.3	184,887	55.2	102,037	67	6,729	4	6,725	3.6
1909.....	7,686	22.6	173,844							
1909.....	7,686	24.4	187,873	54.8	102,947	67	4,454	5	4,449	2.4
1910.....	7,743	22.5	173,832	57.8	100,426	92	9,507	187	9,320	5.4
1911.....	7,627	21.0	160,240	86.9	139,182	122	1,655	2,772	1,117	.7
1912.....	7,630	29.7	223,824	50.5	112,957	68	17,874	15	17,859	8.0
1913.....	7,499	23.8	178,189	53.7	95,731	65	6,945	351	6,594	3.7
1914.....	7,665	25.8	194,953	54.3	105,908	72	28,712	103	28,609	14.7
1915.....	7,148	32.0	228,851	51.6	118,172	69	30,821	37	30,783	13.5
1916.....	7,757	23.5	182,309	88.1	160,646	191	20,319	462	19,857	10.9
1917.....	8,933	23.7	211,759	113.7	240,758	146	28,717	517	28,200	13.3
1918.....	9,740	26.3	256,225	91.7	234,942	104	29,324	24	29,301	11.4
1919.....	6,473	18.9	122,085							
1919.....	6,473	18.9	131,088	121.5	159,258	145	34,691	335	34,356	26.2
1920.....	7,438	23.1	171,533	71.6	122,746	78	27,255	20	27,234	15.9
1921.....	7,073	18.5	130,747	42.1	55,059	61	27,546	8	27,538	21.1
1922.....	6,599	28.3	183,771	52.5	80,793	65	21,909	38	21,871	14.2
1923.....	7,150	22.2	158,967	53.5	85,089	72	13,913	55	13,858	8.7
1924.....	6,767	23.5	159,159							
1924.....	6,910	24.0	165,814	74.7	123,830	90	28,543	48	28,495	17.2
1925.....	8,076	23.9	192,671	58.6	112,809	72	30,448	53	30,395	15.8
1926.....	7,840	20.9	163,712	57.1	93,510	77	19,655	49	19,605	12.0
1927.....	9,419	25.6	240,993	67.5	162,741	91	39,274	45	39,230	16.3
1928.....	12,710	26.1	331,148	54.7	180,980	60	60,295	45	60,249	18.2
1929.....	13,523	20.7	280,242	54.4	152,334	62	24,054	41	24,013	8.6
1930.....	12,662	24.1	304,601	38.9	118,359	54	11,443	1,413	10,025	3.3
1931 <sup>4</sup> .....	11,471	17.3	198,965	35.2	70,119					

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text; italic figures are census returns. See 1927 Yearbook, p. 799, for data for earlier years.

<sup>1</sup> From Bureau of Labor Statistics as follows: Bulletin No. 39, 1900-1901. August, 1900-December, 1901, choice to fancy malting, by samples. Wholesale price bulletins—monthly quotations, January, 1902-December, 1913, choice to fancy malting; January, 1914-September, 1927, fair to good malting. Beginning October, 1927, grade reported as feeding, but as quality remained unchanged, no change was made in comparative prices.

<sup>2</sup> Compiled from Commerce and Navigation of the United States, 1900-1917: Foreign Commerce and Navigation of the United States, 1918: Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1926; January and June issues, 1927-1931; and official records of the Bureau of Foreign and Domestic Commerce. Malt converted to terms of barley on the basis that 1.1 bushels of malt is the product of 1 bushel of barley. Barley flour converted on the basis that 1 barrel of flour is the product of 9 bushels of barley. Exports of flour not reported prior to 1919. Barley—general imports, 1900-1909; imports for consumption, 1910-1931. Malt—general imports, 1909-1914; imports for consumption, 1915-1931. Imports of flour not reported prior to 1915; imports for consumption, 1915-1931.

<sup>3</sup> Total exports (domestic exports plus reexports) minus total imports.

<sup>4</sup> Average for 11 months.

<sup>5</sup> Net imports. Total imports minus total exports (domestic plus foreign).

<sup>6</sup> Preliminary.

## STATISTICS OF GRAINS

631

TABLE 79.—*Barley: Acreage harvested and production, by States, average 1924-1928, annual 1928-1931*

State and division	Acreage harvested					Production				
	Average, 1924- 1928	1928	1929	1930	1931 <sup>1</sup>	Average, 1924- 1928	1928	1929	1930	1931 <sup>1</sup>
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
Maine.....	3	3	3	3	3	95	81	89	96	87
Vermont.....	5	5	5	5	5	141	110	130	140	160
New York.....	182	202	181	168	173	5,184	5,252	4,000	5,208	4,325
New Jersey.....	1	1	1	1	1	29	30	22	32	32
Pennsylvania.....	18	29	36	45	60	445	740	774	1,170	1,580
North Atlan- tic.....	210	240	226	222	242	5,893	6,213	5,015	6,646	6,184
Ohio.....	163	318	91	109	96	4,175	8,427	2,093	2,943	2,736
Indiana.....	36	78	37	38	53	766	1,599	781	950	1,293
Illinois.....	367	624	400	288	287	10,884	15,408	10,800	8,640	8,613
Michigan.....	185	264	231	238	278	4,418	7,524	4,481	6,593	7,226
Wisconsin.....	544	725	708	703	731	17,243	23,925	20,887	23,902	19,006
Minnesota.....	1,383	2,064	2,240	1,994	1,874	38,045	57,792	53,760	53,838	37,480
Iowa.....	367	802	685	548	521	11,415	26,466	19,865	16,168	13,546
Missouri.....	10	11	10	13	23	194	176	135	217	532
North Dakota.....	1,811	2,435	2,875	2,888	1,812	37,630	56,005	38,812	43,996	18,482
South Dakota.....	1,080	1,715	2,070	1,987	1,833	22,797	36,015	35,811	42,720	16,680
Nebraska.....	277	430	648	726	854	6,462	12,470	15,552	18,876	14,091
Kansas.....	426	608	582	512	563	6,171	13,072	9,603	10,496	8,726
North Cen- tral.....	6,607	10,074	10,572	9,744	8,935	160,205	261,879	211,480	229,367	148,433
Maryland.....	9	8	10	12	16	260	220	291	384	528
Virginia.....	12	11	13	15	17	307	314	333	342	570
North Carolina.....	10	16	19	21	24	178	288	342	368	480
South Atlan- tic.....	31	35	42	48	57	744	822	966	1,094	1,578
Kentucky.....	5	2	5	7	12	120	46	118	140	336
Tennessee.....	15	10	11	13	17	268	171	207	229	382
Oklahoma.....	119	62	71	67	117	1,826	1,023	1,136	833	2,457
Texas.....	167	172	194	184	221	3,112	2,924	3,783	2,760	5,194
South Cen- tral.....	305	246	281	271	367	5,318	4,164	5,244	3,967	8,369
Montana.....	160	215	258	232	139	4,303	6,450	4,128	3,828	1,946
Idaho.....	122	182	135	148	168	3,791	4,290	4,820	5,328	4,108
Wyoming.....	87	104	137	130	98	1,418	2,496	2,808	2,600	1,568
Colorado.....	387	512	608	572	458	7,107	11,776	10,944	12,298	7,099
New Mexico.....	7	8	8	6	11	114	144	150	180	253
Arizona.....	13	8	9	10	10	415	272	270	320	320
Utah.....	23	34	38	42	38	887	1,580	1,452	1,806	1,216
Nevada.....	7	8	5	6	5	292	280	181	240	155
Washington.....	65	49	54	58	59	2,042	1,686	1,620	1,827	1,588
Oregon.....	71	76	84	76	74	1,903	2,204	2,662	2,280	2,072
California.....	926	969	1,066	1,094	820	24,460	27,132	29,102	32,820	13,776
Western.....	1,838	2,115	2,402	2,377	1,870	46,708	58,070	57,537	63,527	34,401
United States.....	8,991	12,710	13,523	12,662	11,471	218,868	331,148	280,242	304,601	198,965

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

<sup>1</sup> Preliminary

TABLE 80.—*Barley: Yield per acre, average 1919-1928 and annual 1926-1931, and estimated price per bushel, December 1, average 1925-1929 and annual 1926-1931, by States*

State and division	Yield per acre							Estimated price per bushel, Dec. 1							
	Average, 1919- 1928	1926	1927	1928	1929	1930	1931	Average, 1925- 1929	1926	1927	1928	1929	1930	1931	
	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	
Maine.....	28.6	30.0	27.0	27.0	29.7	32.0	29.0	95	92	94	110	100	81	50	
Vermont.....	25.4	26.0	26.0	22.0	26.0	28.0	30.0	93	85	95	110	90	85	60	
New York.....	25.9	28.3	29.0	26.0	22.1	31.0	25.0	79	76	80	78	84	62	45	
New Jersey.....	26.4	33.0	37.0	30.0	22.0	32.0	32.0	85	85	83	86	85	65	43	
Pennsylvania.....	22.2	24.5	24.0	25.5	21.5	26.0	26.5	85	80	83	84	90	70	49	
North Atlantic.....	25.7	28.0	28.5	25.9	22.2	29.9	25.6	80.0	75.9	80.7	79.8	85.4	64.2	46.5	
Ohio.....	25.1	30.0	26.0	26.5	23.0	27.0	28.5	65	62	72	60	61	50	32	
Indiana.....	20.3	25.0	20.0	20.5	21.1	25.0	24.4	66	66	73	59	62	50	30	
Illinois.....	29.4	31.0	29.5	29.5	25.5	30.0	29.0	61	58	73	53	56	48	39	
Michigan.....	23.4	26.5	26.5	28.5	19.4	27.7	26.0	70	65	76	70	69	55	40	
Wisconsin.....	28.9	31.0	31.0	33.0	29.0	34.0	26.0	67	65	75	65	65	51	43	
Minnesota.....	24.6	22.5	28.0	28.0	24.0	27.0	20.0	53	51	65	50	48	35	34	
Iowa.....	27.8	28.5	30.0	33.0	29.0	29.5	26.0	57	56	66	54	52	41	34	
Missouri.....	19.9	18.0	18.5	16.0	13.5	19.0	24.0	86	80	95	80	80	60	37	
North Dakota.....	18.4	13.5	22.5	23.0	13.5	17.0	10.2	47	46	59	43	42	26	26	
South Dakota.....	19.6	9.0	26.0	21.0	17.3	21.5	9.1	50	52	58	48	45	29	32	
Nebraska.....	21.6	16.5	27.5	29.0	24.0	26.0	16.5	54	58	55	51	50	35	28	
Kansas.....	15.7	9.8	12.0	21.5	16.5	20.5	15.5	55	61	55	60	50	37	22	
North Central.....	22.0	19.0	25.6	26.0	20.0	23.5	16.6	54.5	54.7	64.0	51.2	49.7	35.7	33.2	
Maryland.....	27.3	30.0	26.5	27.5	29.1	32.0	33.0	84	80	87	85	82	75	45	
Virginia.....	25.4	29.5	24.0	28.5	25.6	22.8	33.5	91	90	87	85	96	87	45	
North Carolina.....	18.5	20.0	18.5	18.0	13.0	17.5	20.0	116	100	110	120	128	106	70	
South Atlantic.....	24.9	26.7	22.5	23.5	23.0	22.8	27.7	97.3	88.9	94.4	97.3	103.2	89.2	52.6	
Kentucky.....	22.5	26.5	22.5	23.0	23.5	20.0	28.0	92	86	91	91	99	83	42	
Tennessee.....	17.7	22.5	14.5	17.1	18.8	17.6	22.5	104	96	100	110	102	98	56	
Oklahoma.....	15.6	20.0	11.0	16.5	16.0	12.5	21.0	65	58	65	65	63	51	26	
Texas.....	19.3	29.0	13.5	17.0	19.5	15.0	23.5	70	53	70	73	62	55	29	
South Central.....	17.7	25.3	13.0	16.9	18.7	14.6	22.8	70.7	57.2	71.6	72.8	64.6	57.6	29.9	
Montana.....	22.8	24.0	33.0	30.0	16.0	16.5	14.0	64	64	60	56	68	41	42	
Idaho.....	29.6	29.0	34.5	32.5	32.0	36.0	26.0	63	60	68	63	66	41	38	
Wyoming.....	22.6	25.5	27.0	24.0	20.5	20.0	16.0	62	62	61	61	64	44	40	
Colorado.....	19.4	15.5	20.0	23.0	13.0	21.5	15.5	55	55	56	54	54	40	31	
New Mexico.....	17.6	23.0	16.0	13.0	18.7	20.0	23.0	75	65	70	75	81	62	33	
Arizona.....	30.1	27.0	30.0	34.0	30.0	32.0	32.0	85	85	75	80	85	65	55	
Utah.....	32.3	34.0	39.0	40.0	38.2	43.0	32.0	77	72	76	73	78	52	52	
Nevada.....	36.0	40.0	47.0	35.0	36.2	40.0	31.0	82	85	80	80	85	65	62	
Washington.....	31.5	32.0	39.0	34.0	30.0	31.5	32.0	72	65	77	70	78	47	42	
Oregon.....	26.2	24.0	31.0	29.0	30.5	30.0	28.0	73	65	77	72	77	50	45	
California.....	26.6	27.3	26.5	28.0	27.3	30.0	16.8	74	58	93	72	70	48	49	
Western.....	25.7	24.9	27.2	27.5	24.0	26.7	18.4	68.2	59.6	77.8	65.5	67.1	45.6	42.6	
United States.....	22.8	20.9	25.6	26.1	20.7	24.1	17.8	58.5	57.1	67.5	54.7	54.4	38.9	35.2	

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

1 5-year average.

TABLE 81.—*Barley: World production, 1894-95 to 1931-32*

Crop year	Estimated world production, excluding Russia	Estimated European production, excluding Russia	Selected countries							
			United States	Russia <sup>1</sup>	Germany	Japan	Canada	India	Spain	Rumania
	1,000,000 bushels	1,000,000 bushels	1,000,000 bushels	1,000,000 bushels	1,000,000 bushels	1,000,000 bushels	1,000,000 bushels	1,000,000 bushels	1,000,000 bushels	1,000,000 bushels
1894-95	935	544	78	197	181	81			57	17
1895-96	1,008	527	115	226	128	80			47	22
1896-97	973	528	99	254	125	71			36	32
1897-98	907	481	103	239	118	73			46	21
1898-99	1,040	564	100	307	130	83			73	30
1899-1900	1,017	533	117	227	137	77			54	5
1900-01	1,269	522	96	237	138	82			57	15
1901-02	1,085	570	122	240	153	83			80	24
1902-03	1,127	592	149	338	142	74			81	25
1903-04	1,099	589	147	357	153	60			64	30
1904-05	1,068	512	162	346	135	81			54	12
1905-06	1,087	532	170	347	134	77			46	26
1906-07	1,226	610	192	331	143	84			90	34
1907-08	1,161	569	170	377	161	90			54	20
1908-09	1,132	536	185	402	141	87	47		70	13
1909-10	1,338	621	188	502	161	87	55		79	20
1910-11	1,242	580	174	488	133	82	29		76	29
1911-12	1,326	606	160	437	145	86	44		87	26
1912-13	1,345	589	224	496	160	91	49		60	21
1913-14	1,400	637	178	600	169	101	48		69	27
1914-15	1,213	546	195	<sup>2</sup> 433	144	86	36	125	72	26
1915-16	1,244	477	229	<sup>3</sup> 429	114	95	54	143	84	29
1916-17	1,201	507	182	<sup>4</sup> 305	128	89	43	148	87	30
1917-18	1,170	427	212	325	<sup>5</sup> 86	89	55	156	78	
1918-19	1,277	424	256		94	<sup>6</sup> 89	77	156	90	<sup>7</sup> 5
1919-20	1,120	483	148		75	95	56	130	82	32
1920-21	1,251	554	189	216	82	92	63	150	90	68
1921-22	1,240	555	155	118	89	88	60	117	89	44
1922-23	1,306	588	182	176	74	87	72	146	78	94
1923-24	1,416	649	198	196	108	71	77	145	112	61
1924-25	1,311	566	182	181	110	75	89	137	84	31
1925-26	1,486	672	214	269	119	91	87	123	99	47
1926-27	1,456	674	185	246	113	88	100	121	96	77
1927-28	1,484	659	266	203	126	82	97	119	92	58
1928-29	1,699	743	357	256	154	81	136	98	82	69
1929-30	1,747	827	280	325	146	80	102	118	97	126
1930-31	1,687	762	305		131	72	135	107	104	109
1931-32 <sup>7</sup>	1,455	696	199		139	77	67		91	65

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

<sup>1</sup> Includes all Russian territory reporting for the years shown.

<sup>2</sup> Total Russian Empire exclusive of the 10 Vistula Provinces of Russian Poland and the Province of Batum in Transcaucasia.

<sup>3</sup> Exclusive of Russian Poland, Lithuania, parts of present Latvia and the Ukraine, and two Provinces of Transcaucasia.

<sup>4</sup> Beginning this year, estimates within present boundaries of the Union of Socialist Soviet Republics excluding Turkestan, Transcaucasia, and the Far East, which regions in 1924-25 produced 20,897,000 bushels.

<sup>5</sup> Postwar boundaries beginning this year and therefore not comparable with earlier years.

<sup>6</sup> Beginning this year weighed bushels, those reported for the earlier years being measured bushels.

<sup>7</sup> Preliminary.

TABLE 82.—Barley: Acreage, yield per acre, and production in specified countries, average 1921-22 to 1925-26, annual 1928-29 to 1931-32

Country	Acreage				Yield per acre				Production			
	Average 1921-22 to 1925-26	1928-29	1930-31	1931-32	Average 1921-22 to 1925-26	1928-29	1930-31	1931-32	Average, 1921-22 to 1925-26	1928-29	1930-31	1931-32
NORTH AMERICAN COUNTRIES												
North America:												
Canada:	1,000 acres	1,000 acres	1,000 acres	1,000 acres	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels	1,000 bushels
United States:	8,022 7,498	4,881 5,928	5,559 12,523	3,768 11,471	26.4 24.8	27.9 28.4	17.3 20.7	17.9 24.1	70,869 180,029	136,391 337,487	136,100 304,401	17,888 186,966
Estimated North American total:	11,200	17,900	18,800	15,700					267,000	499,000	443,000	271,000
Europe:												
England and Wales:	1,352	1,188	1,120	1,039	34.2	40.1	41.6	33.7	46,274	47,546	46,552	34,377
Scotland:	168	112	101	88	38.6	42.9	46.7	41.4	6,092	4,807	4,713	4,433
Irish Free State:	156	120	118	116	38.3	47.6	50.5	47.6	5,981	6,146	5,990	5,517
Norway:	137	149	132	134	32.0	34.4	34.3	36.7	4,383	5,133	4,533	4,922
Sweden:	409	282	308	313	31.6	34.0	36.9	33.8	12,921	9,891	11,372	11,021
Denmark:	605	877	917	928	46.4	57.6	55.7	52.0	32,246	50,541	61,093	48,271
Netherlands:	63	70	76	70	52.4	64.2	64.2	62.9	3,302	4,494	5,010	3,815
Belgium:	84	77	63	84	49.1	56.7	45.0	45.5	4,127	4,364	2,834	3,396
France:	1,713	1,768	1,946	1,969	25.6	29.0	30.6	24.7	43,892	60,856	69,604	64,806
Spain:	4,343	4,440	4,430	4,643	21.2	18.4	21.7	22.9	92,288	81,740	97,339	103,922
Portugal:	182	178	174	171	14.8	8.0	11.3	13.8	2,653	1,430	1,058	2,367
Italy:	567	560	579	583	17.9	10.7	20.8	19.2	10,132	12,072	12,602	11,020
Germany:	3,198	3,753	3,835	4,001	32.1	41.0	38.1	35.0	100,182	163,721	146,059	131,360
Austria:	320	360	330	322	22.1	33.6	31.6	28.6	7,072	12,951	12,375	10,665
Czechoslovakia:	1,670	1,820	1,836	1,759	30.0	36.3	34.9	33.4	50,119	66,020	64,072	55,982
Hungary:	1,066	1,020	1,178	1,180	20.3	30.1	29.6	24.4	22,198	80,671	81,352	27,005
Yugoslavia:	922	943	1,055	1,134	15.6	10.2	17.9	16.4	14,027	18,106	18,917	18,562
Greece:	383	490	357	529	14.8	14.5	13.3	15.4	5,676	7,246	4,755	8,172
Bulgaria:	539	605	542	692	17.2	25.8	17.3	28.7	9,266	15,691	9,881	16,560
Rumania:	4,315	4,322	5,074	4,881	12.8	16.1	24.8	22.3	55,265	69,401	125,867	108,912
Poland:	2,647	2,857	3,110	3,048	10.6	24.6	24.5	22.1	27,634	70,143	76,233	67,616
Lithuania:	451	418	529	474	16.5	23.2	20.6	23.5	9,284	6,910	12,254	11,133
Latvia:	362	362	452	437	16.9	9.0	21.1	19.7	6,979	3,275	9,545	9,232
Estonia:	303	283	281	276	18.0	16.0	20.2	20.4	5,404	4,211	5,687	5,836
Finland:	273	272	284	273	21.2	21.2	22.7	22.9	5,732	6,767	6,459	6,223
Russia, European and Asiatic:	14,793	13,136	19,908	17,070	12.7	14.1	16.3	23.3	187,970	266,198	324,793	
Total Europe reporting area and production all years:	25,549	23,538	23,300	23,174	23.1	27.4	28.7	24.1	591,105	728,892	813,285	677,951
Estimated European total excluding Russia:	24,300	27,400	23,000	29,000					693,000	743,000	827,000	693,000

Africa:	Morocco.....	2,862	2,904	3,207	3,156	14.1	16.6	14.6	11.7	16.3	40,304	48,280	47,316	37,400	51,341
	Algeria.....	3,017	3,411	3,674	3,199	10.2	11.6	11.4	10.4	9.7	30,779	39,716	40,445	38,182	31,003
	Tunisia.....	1,083	1,459	1,202	1,306	6.6	8.7	9.2	4.6	7.6	6,843	12,681	11,482	5,512	8,288
	Egypt.....	281	368	345	306	30.0	29.5	31.6	30.4	31.7	11,427	10,798	12,669	10,505	9,663
	Estimated African total.....	8,100	8,400	8,900	8,200	—	—	—	—	—	101,000	117,000	120,000	98,000	107,000
Asia:	Turkey.....	2,146	3,692	3,418	—	29.5	11.3	24.2	20.4	—	57,482	41,319	77,083	66,348	—
	India.....	7,801	7,888	8,601	—	17.8	12.4	12.8	12.4	—	133,768	97,720	117,600	106,867	—
	Syria and Lebanon.....	1,706	1,924	2,000	941	49.5	14.9	30.7	28.2	15.1	7,300	13,769	24,406	23,769	14,163
	Japan.....	2,680	2,242	2,115	2,105	31.4	36.3	36.6	34.3	36.4	82,490	81,477	80,374	79,470	76,522
	China.....	2,181	2,208	2,382	2,410	17.2	15.5	15.4	16.7	17.4	86,807	34,167	37,612	39,847	41,861
SOUTHERN HEMISPHERE	Estimated Asiatic total.....	17,100	19,600	20,200	17,800	—	—	—	—	—	347,000	298,000	368,000	343,000	333,000
	Total Northern Hemisphere countries reporting area and production all years.....	48,919	57,532	59,908	58,617	21.9	25.4	23.6	23.6	20.8	1,060,783	1,461,548	1,450,144	1,411,227	1,177,180
	Estimated Northern Hemisphere total excluding Russia and China.....	62,700	73,300	70,400	70,700	—	—	—	—	—	1,321,000	1,657,000	1,700,000	1,646,000	1,407,000
	Chile.....	162	194	166	106	33.0	31.5	30.2	22.3	—	5,347	6,116	4,589	3,876	—
	Argentina.....	504	911	921	1,439	19.7	18.5	20.1	15.2	13.1	9,924	10,814	16,131	14,000	18,381
SOUTHERN HEMISPHERE	Union of South Africa.....	97	74	70	—	12.3	18.6	23.0	14.9	—	1,189	1,376	2,067	1,616	—
	Australia.....	307	355	451	—	19.7	19.4	17.5	—	—	6,943	6,863	7,905	—	—
	Estimated Southern Hemisphere total.....	1,800	2,300	2,100	2,600	—	—	—	—	—	31,000	42,000	47,000	41,000	48,000
	Total Northern and Southern Hemisphere countries reporting area and production all years.....	40,428	48,443	60,820	58,056	21.8	25.3	23.6	23.4	20.6	1,079,707	1,478,362	1,466,275	1,425,227	1,196,011
	Estimated world total excluding Russia and China.....	64,200	75,600	78,500	73,300	—	—	—	—	—	1,352,000	1,699,000	1,717,000	1,687,000	1,455,000

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

1 Preliminary.

2 2-year average.

3 1 year only.

4 4-year average.

5 Acreage sown.

6 Yield per acre sown.

TABLE 83.—*Barley: Monthly marketings by farmers as reported by about 3,500 mills and elevators, United States, 1921-22 to 1930-31*

Crop year	Percentage of year's receipts											
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1921-22.....	14.0	10.5	7.8	4.4	4.2	3.9	4.3	4.2	3.0	4.4	4.3	35.0
1922-23.....	22.9	14.6	10.8	5.2	6.0	4.8	3.2	3.5	1.9	2.7	7.0	17.4
1923-24.....	23.7	15.1	9.9	7.8	6.5	4.1	3.5	3.1	2.6	2.3	11.1	10.3
1924-25.....	16.8	21.4	17.0	8.1	5.7	5.1	3.8	3.3	2.4	2.7	4.7	9.0
1925-26.....	19.1	18.4	11.7	6.6	5.1	4.0	3.4	3.1	2.0	3.3	6.0	16.4
1926-27.....	16.5	11.6	7.4	6.2	4.8	5.1	3.2	3.0	3.6	4.1	16.2	17.4
1927-28.....	17.4	18.7	12.2	8.0	5.7	4.7	4.5	4.5	2.1	2.7	10.4	9.1
1928-29.....	21.4	18.3	11.8	6.7	6.0	3.5	3.9	3.2	2.7	2.5	7.4	12.6
1929-30.....	24.7	14.0	8.9	5.6	5.1	3.3	3.2	3.1	2.6	3.2	9.9	16.4
1930-31.....	25.0	15.7	10.0	5.8	5.0	4.6	3.5	3.2	3.2	3.4	13.9	6.7

Bureau of Agricultural Economics.

TABLE 84.—*Barley: Receipts at specified markets, 1921-22 to 1930-31*

Year beginning August	Minneapolis	Duluth	Chicago	Milwaukee	Omaha	Total 5 markets	Fort William and Port Arthur <sup>1</sup>
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1921-22.....	11,926	5,179	7,573	9,330	1,152	35,160	11,597
1922-23.....	14,244	3,844	10,103	8,922	801	37,914	15,756
1923-24.....	15,396	3,654	9,755	9,077	948	38,830	15,910
1924-25.....	23,158	14,501	11,338	13,127	796	62,918	28,045
1925-26.....	23,245	13,244	9,540	10,673	729	57,431	36,682
1926-27.....	12,086	6,667	8,388	8,440	594	36,173	36,784
1927-28.....	22,982	22,630	11,320	11,061	1,768	69,761	23,652
1928-29.....	27,174	32,764	16,680	13,554	2,259	92,431	45,498
1929-30.....	18,039	11,064	6,601	13,121	1,656	50,501	18,781
1930-31 <sup>2</sup> .....	18,080	6,165	6,562	10,883	1,038	42,828	16,141

Bureau of Agricultural Economics. Compiled from reports of Minneapolis Chamber of Commerce, Duluth Board of Trade, Chicago Board of Trade, Milwaukee Chamber of Commerce, Omaha Grain Exchange, American Elevator and Grain Trade, and Canadian Grain Statistics.

<sup>1</sup> Crop year begins September<sup>2</sup> Preliminary.TABLE 85.—*Barley: Classification of receipts graded by licensed inspectors, at all inspection points, total of all classes under each grade, 1926-27 to 1930-31*

Year beginning July	Grade										
	Choice No. 1	No. 1	Choice No. 2	Special No. 2	No. 2	Choice No. 3	No. 3	No. 4	No. 5	No. 1 feed	Sample
1926-27 <sup>1</sup> .....	Cars 251	Cars 481	Cars 107	Cars 2,168	Cars 2,005	Cars 421	Cars 4,929	Cars 4,026	Cars 266	Cars 916	Cars 15,063
1927-28.....	263	2,199	90	14,913	12,151	274	16,289	6,197	183	2,875	10,923
1928-29.....	329	966	100	13,128	20,900	392	25,284	20,129	135	6,502	11,021
1929-30.....	223	700	50	9,806	5,800	315	13,907	7,269	102	3,602	5,124
1930-31.....	261	1,483	76	11,629	7,067	249	12,489	6,305	127	2,034	1,927

Bureau of Agricultural Economics.

<sup>1</sup> Barley grades became effective Aug. 24, 1926.

# STATISTICS OF GRAINS

637

TABLE 86.—*Barley: Commercial stocks in store, 1926-27 to 1931-32*

## DOMESTIC BARLEY IN UNITED STATES:

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1926-27												
1927-28	3,108	5,041	6,549	5,957	5,769	7,097	6,164	6,116	5,339	3,675	3,046	2,759
1928-29	3,395	9,318	10,681	11,007	11,744	10,926	11,985	11,399	9,968	8,412	7,873	6,861
1929-30	9,798	12,894	12,568	12,731	11,760	12,074	10,961	10,415	9,726	8,137	6,843	6,366
1930-31	6,746	10,945	13,856	15,018	14,637	13,987	14,261	12,279	10,159	7,319	6,232	6,716
1931-32	6,568	7,093	7,211	7,355	7,124							

## UNITED STATES BARLEY IN CANADA

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1926-27						272	300	64	70	50	0	13
1927-28	5	66	605	344	152	40	42	9	25	9	1	1
1928-29	0	767	4,171	5,969	2,319	1,144	312	173	170	81	92	679
1929-30	279	246	1,266	1,749	955	972	937	938	936	993	963	967
1930-31	797	652	580	444	371	338	309	281	272	243	68	45
1931-32	45	24	24	24								

## CANADIAN BARLEY IN UNITED STATES:

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1926-27						2,942	2,246	1,677	608	2,401	1,573	175
1927-28	19	27	27	717	1,768	1,945	1,409	1,191	537	112	483	278
1928-29	300	249	1,751	2,969	4,778	6,210	4,731	3,232	2,239	2,523	3,315	2,110
1929-30	2,277	1,711	1,654	1,999	2,637	3,056	3,006	2,928	2,781	2,715	2,376	2,376
1930-31	1,859	1,800	725	832	1,561	1,329	1,274	1,267	903	704	627	373
1931-32	119	3	4	4	649							

Bureau of Agricultural Economics. Compiled from weekly reports to the grain, hay, and feed market news service. Data are for stocks on the Saturday nearest the 1st day of the month.

<sup>1</sup> Includes barley in store in public and private elevators in 42 important markets and also barley afloat in vessels or barges in harbors of lake and seaboard ports. Barley in transit either by rail or water, mill stocks, or small private stocks of barley intended only for local purposes, not included.

<sup>2</sup> Includes barley stored at lake and seaboard ports, exclusive of barley in transit on lakes and canals.

TABLE 87.—*Barley: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32*

Crop year	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weighted average
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1922-23	47.7	40.2	49.2	52.0	55.6	50.8	56.2	58.0	59.6	60.8	58.3	54.7	51.8
1923-24	52.2	51.9	54.7	55.2	57.6	56.3	58.0	60.0	61.0	60.0	61.9	68.8	56.6
1924-25	73.7	75.6	61.4	79.7	76.2	82.4	84.8	81.5	76.1	75.9	76.4	73.5	77.4
1925-26	67.1	60.8	57.6	58.0	58.4	59.5	56.3	54.6	54.8	55.1	53.7	55.3	59.2
1926-27	55.0	52.9	54.4	56.0	56.4	58.0	61.3	62.2	64.1	63.4	76.3	71.4	61.9
1927-28	69.0	60.5	66.8	66.8	71.5	73.6	75.4	79.4	81.3	84.5	81.7	77.6	72.7
1928-29	58.9	54.1	53.2	54.5	55.0	56.2	60.5	60.1	58.0	55.3	52.8	55.6	56.1
1929-30	55.8	55.2	54.7	53.8	54.6	53.9	52.5	51.4	51.7	50.5	47.5	40.0	51.8
1930-31	43.6	45.3	41.9	38.3	38.8	36.6	35.3	34.4	35.2	35.5	32.6	30.0	39.3
1931-32	28.9	30.9	31.0	35.5	35.7								

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices reported on 1st of month and 1st of succeeding month, August, 1922-December, 1923.

TABLE 88.—*Barley, excluding flour and malt: International trade, average 1925-26 to 1929-30, annual 1927-28 to 1930-31*

Country	Year beginning July									
	Average 1925-26 to 1929-30		1927-28		1928-29		1929-30		1930-31 <sup>1</sup>	
	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
<b>PRINCIPAL EXPORT- ING COUNTRIES</b>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>
United States.....	31,869	0	36,580	0	51,996	0	21,544	0	10,300	0
Rumania <sup>2</sup> .....	30,308	0	25,560	0	17,550	0	63,522	0	70,214	0
Canada.....	25,724	14	25,131	3	33,668	8	6,396	17	16,603	1
Russia.....	19,605	0	1,414	0				0		0
Argentina.....	9,355	6	11,508	0	8,591		5,986		11,612	0
Poland.....	7,129	90	3,054	133	7,989	102	12,476	6	6,011	2
Czechoslovakia.....	5,301	366	7,367	64	3,643	14	5,293	31	6,252	8
Algeria.....	4,701	750	6,671	166	6,663	262	5,298	305		
Tunis.....	4,261	477	1,016	1,309	7,278	42	6,734	79	621	894
Chile.....	2,936	0	2,478	0	2,137	0	1,859	0	1,167	0
Hungary.....	2,611	3	2,221	5	1,230	2	4,966	2	1,231	7
British India.....	2,169		3,289		1,403		46		261	
Bulgaria.....	1,650	0	3,438	0	1,969	0	650	0	3,307	0
Australia.....	1,235	1	1,304	0	1,332	0	675	2	3,220	0
Yugoslavia <sup>4</sup> .....	790	412	1,005	375	256	485	491	375	100	306
Spain.....	531	379	573	1	414	319	330	18	335	0
Sweden.....	507	13	16	40	24	3	92	2	4	41
Egypt.....	311	213	674	11	718	1	138	75	5	239
<b>Total.....</b>	<b>154,015</b>	<b>2,724</b>	<b>138,559</b>	<b>2,112</b>	<b>156,911</b>	<b>1,238</b>	<b>136,496</b>	<b>912</b>	<b>131,473</b>	<b>1,408</b>
<b>PRINCIPAL IMPORT- ING COUNTRIES</b>										
Germany.....	642	83,542	199	85,765	409	78,441	2,000	102,528	423	35,233
United Kingdom.....		32,134		34,033		31,418		29,798		37,938
Netherlands.....	790	14,460	711	10,177	1,159	17,045	1,067	16,572	1,232	30,201
Belgium.....	253	13,686	333	11,855	192	14,592	811	10,506	2,201	21,564
Denmark.....	2,891	3,494	3,291	2,294	2,884	1,630	2,738	7,522	2,569	30,974
Switzerland.....	0	3,306	0	2,811	0	4,262	0	3,802	1	5,770
Austria.....	134	3,163	815	2,849	38	2,432	23	3,800	36	4,471
France.....	1,044	2,530	3,108	1,538	452	5,493	693	3,230	87	15,090
Norway.....	0	1,322	0	1,314	0	1,102	0	1,617	0	2,293
Irish Free State.....	430	885	612	480	436	849	53	1,067	42	595
Greece.....	0	593	0	145	0	603	0	874	0	171
Cuba.....	0	280	0	171	0	3	0		0	
Estonia.....	0	244	0	195	0	516	0	154	0	34
Italy.....	23	209	16	273	17	123	3	193	0	1,206
<b>Total.....</b>	<b>6,212</b>	<b>100,083</b>	<b>8,585</b>	<b>153,930</b>	<b>5,587</b>	<b>158,494</b>	<b>6,888</b>	<b>137,663</b>	<b>6,591</b>	<b>135,573</b>

Bureau of Agricultural Economics. Official sources except where otherwise noted.

<sup>1</sup> Preliminary.<sup>2</sup> Monthly Crop Report and Agricultural Statistics.<sup>3</sup> 3-year average.<sup>4</sup> Calendar year.<sup>5</sup> 4-year average.

## STATISTICS OF GRAINS

689

TABLE 89.—*Barley, No. 2: Weighted average price<sup>1</sup> per bushel of reported cash sales, Minneapolis, 1909-10 to 1931-32*

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Weighted average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1909-10.....	45	48	49	52	57	61	60	58	54	54	53	60	54
1910-11.....	61	63	63	66	70	77	74	81	88	75	77	87	74
1911-12.....	85	94	95	98	91	105	100	95	101	99	76	60	92
1912-13.....	46	49	50	47	45	49	48	46	46	50	52	48	48
1913-14.....	58	61	56	53	50	52	50	48	47	48	47	45	51
1914-15.....	59	58	55	59	57	68	75	70	70	70	66	68	65
1915-16.....	59	48	51	56	61	70	68	65	65	70	68	69	63
1916-17.....	81	81	103	111	107	117	117	121	136	148	138	149	117
1917-18.....	131	133	128	127	149	156	188	212	182	146	123	118	149
1918-19.....	102	95	91	94	92	90	87	93	109	113	112	121	100
1919-20.....	133	127	129	133	152	152	137	151	160	174	149	116	143
1920-21.....	102	99	92	82	74	69	65	67	61	59	57	62	74
1921-22.....	58	55	50	54	47	51	56	58	61	62	56	56	55
1922-23.....	49	54	57	60	61	57	60	59	64	61	58	59	53
1923-24.....	56	58	60	61	62	62	68	70	75	70	73	76	63
1924-25.....	80	81	85	81	87	93	94	88	81	84	84	84	84
1925-26.....	72	66	65	63	65	65	62	62	63	65	64	67	67
1926-27.....	63	62	65	64	67	69	71	72	77	88	98	81	71
1927-28.....	77	72	73	77	83	84	87	90	92	93	94	95	84
1928-29.....	65	63	63	62	62	66	70	67	65	60	60	69	65
1929-30 <sup>1</sup> .....	62	63	59	60	60	58	57	56	57	56	50	48	59
1930-31 <sup>1</sup> .....	53	54	52	48	47	44	44	48	45	45	39	42	47
1931-32 <sup>1</sup> .....	45	50	50	51	51	-----	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Compiled from Minneapolis Daily Market Record.

<sup>1</sup> Average of daily prices weighted by car-lot sales.<sup>2</sup> Special No. 2 barley used, August, 1929, to end of table.TABLE 90.—*Flaxseed: Acreage and production, by States, average 1924-1928, annual 1928-1931*

State	Acreage					Production				
	Average, 1924-1928	1928	1929	1930	1931 <sup>1</sup>	Average, 1924-1928	1928	1929	1930	1931 <sup>1</sup>
	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>
Wisconsin.....	10	9	7	7	7	128	122	77	77	66
Minnesota.....	750	726	512	742	861	7,264	5,808	4,608	7,420	6,027
Iowa.....	14	10	13	20	27	160	198	117	230	216
Missouri.....	4	7	2	2	2	27	56	10	14	10
North Dakota.....	1,420	1,143	1,421	1,677	1,006	10,307	8,344	6,394	7,882	3,521
South Dakota.....	546	554	669	702	185	4,162	3,601	3,144	3,299	462
Nebraska.....	7	8	20	28	6	61	64	140	164	21
Kansas.....	39	25	23	37	81	256	172	126	240	336
Montana.....	202	183	362	481	144	1,444	1,596	1,195	1,780	331
Wyoming.....	-----	1	18	36	14	-----	7	99	144	28
United States..	2,993	2,675	3,047	3,732	2,813	23,816	19,928	15,910	21,240	11,018

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.

TABLE 91.—*Flaxseed: Acreage, production, value, foreign trade, net supply, etc., United States, 1909-1931*

Year	Acreage	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value, basis Dec. 1 farm price	Price per bushel of No. 1 Flaxseed at Minneapolis, year beginning Sept. 1 <sup>1</sup>	Flaxseed, including linseed oil, in terms of seed, year beginning Sept. 1 <sup>2</sup>			Net supply
							Imports	Exports, domestic and foreign	Net imports	
	1,000 acres	Bushels of 56 lbs.	1,000 bushels	Cents	1,000 dollars	Cents	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1909	2,083	8.1	16,515	152.8	30,083	206	6,074	152	5,922	25,621
1909	2,083	8.5	19,999	152.7	29,472	249	12,010	73	11,937	24,555
1910	2,467	8.2	20,178	151.7	35,272	214	7,948	126	7,722	27,092
1911	2,757	7.0	19,370	152.1	32,202	188	3,845	897	2,048	31,021
1912	2,831	9.8	28,073	114.7	21,399	162	9,772	216	9,556	27,409
1913	2,291	7.8	17,853	110.9	17,318	170	12,729	571	12,158	25,907
1914	1,645	8.4	13,749	126.0	24,410	204	14,441	313	14,128	23,158
1915	1,387	10.1	14,030	174.0	35,541	291	10,946	507	10,439	24,739
1916	1,474	9.7	14,296	248.6	27,182	378	14,042	467	13,575	22,739
1917	1,684	4.6	9,164	296.6	45,470	419	9,230	483	8,748	22,117
1918	1,910	7.0	13,369	340.1	31,475	452	26,483	467	26,016	33,194
1919	1,891	5.3	6,658	438.5	18,999	209	16,174	219	15,955	26,707
1919	1,503	4.8	7,178	176.7	11,643	219	23,889	149	23,240	31,209
1920	1,757	6.1	10,762	145.1	21,941	258	20,009	161	28,848	30,223
1921	1,108	7.2	8,029	211.5	26,951	244	19,557	145	19,412	36,472
1922	1,113	9.3	10,375	210.7	71,728	263	12,849	124	12,725	44,272
1923	2,014	8.5	17,060	227.4	50,783	252	20,858	148	20,710	43,184
1924	3,435	8.2	28,246	226.5	37,510	224	24,155	112	24,043	43,378
1924	3,469	9.1	31,547	194.0	48,079	220	18,177	120	18,057	43,904
1925	3,078	7.3	22,424	186.0	40,098	233	23,611	106	23,505	43,433
1926	2,907	6.7	19,335	201.2	45,240	232	18,587	109	18,478	35,477
1927	2,837	9.1	25,847	284.3	29,684	105	9,940	69	9,871	33,553
1928	2,675	7.4	19,928	139.8	13,243					
1929	3,047	6.2	15,910	120.2						
1930	3,732	5.7	21,240							
1931 <sup>3</sup>	2,313	4.8	11,018							

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board; italic figures are census returns. See 1927 Yearbook, page 809, for data for earlier years.

<sup>1</sup> The figures shown, 1909-1920 are averages of daily closing prices compiled from annual reports of the Minneapolis Chamber of Commerce; 1921-1923, are averages of daily prices weighted by car-lot sales, compiled from Minneapolis Daily Market Record.

<sup>2</sup> Compiled from Commerce and Navigation of the United States, 1909-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June, July, and August issues, 1919-1926 January, June, July and August issues, 1927-1930, and official records of the Bureau of Foreign and Domestic Commerce. 1 bushel of flaxseed weighs 56 pounds; 1 bushel of seed yields 2½ gallons of oil; and 1 gallon of oil weighs 7½ pounds.

<sup>3</sup> Preliminary.

TABLE 92.—*Flaxseed: Yield per acre, average 1919-1928, and annual 1926-1931, and estimated price per bushel December 1, average 1925-1929, and annual 1926-1931, by States*

State	Yield per acre							Estimated price per bushel Dec. 1						
	Av., 1919-1928	1926	1927	1928	1929	1930	1931	Av., 1925-1929	1926	1927	1928	1929	1930	1931
	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
Wisconsin	12.3	12.0	13.2	13.5	11.0	11.0	9.5	217	200	190	199	270	156	123
Minnesota	9.6	9.4	9.7	8.0	9.0	10.0	7.0	222	197	192	205	287	145	123
Iowa	10.4	11.6	12.0	10.4	9.0	11.5	8.0	217	195	195	198	275	155	120
Missouri	7.8	8.0	6.5	8.0	5.0	7.0	5.0	206	195	188	190	265	150	100
North Dakota	6.9	5.5	8.2	7.3	4.5	4.7	3.5	218	193	184	201	287	139	117
South Dakota	7.9	5.8	10.0	6.5	4.7	4.7	2.5	216	190	185	201	280	133	117
Nebraska	8.4	8.7	10.0	8.0	7.0	5.5	3.5	212	185	175	190	280	125	95
Kansas	6.6	6.9	5.5	6.9	5.5	5.5	5.5	201	200	185	185	234	156	120
Montana	6.0	4.2	10.2	8.5	3.3	3.7	2.3	210	185	175	192	280	131	110
Wyoming	16.9			7.0	5.5	4.0	2.0				195	275	129	115
United States	7.6	6.7	9.1	7.4	5.2	5.7	4.8	218.4	194.0	186.0	201.2	284.3	139.8	120.2

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> 8-year average.

# STATISTICS OF GRAINS

641

TABLE 93.—*Flaxseed: World production, 1920-21 to 1931-32*

Year	World production, including Russia <sup>1</sup>	North- ern hemis- phere production, including Russia	Euro- pean production, including Russia	Selected countries							
				Argen- tina <sup>2</sup>	Russia	United States	India	Canada	Poland	Lithu- ania <sup>3</sup>	Ur- uguay
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1920-21	110,811	49,638	14,894	60,006	9,204	18,029	16,769	7,998	637	1,011	966
1921-22	77,467	40,773	14,424	36,016	9,752	10,375	10,800	4,112	858	909	519
1922-23	105,430	56,921	16,813	47,577	11,043	17,060	17,440	3,008	1,515	1,108	710
1923-24	136,284	76,983	19,064	58,005	13,379	28,246	21,320	7,140	2,120	1,036	1,175
1924-25	131,221	84,460	23,982	45,084	16,960	31,547	18,520	9,685	1,872	1,832	1,512
1925-26	159,128	81,876	32,301	75,113	23,991	22,424	20,040	6,237	2,270	1,571	2,030
1926-27	153,945	71,080	28,861	80,788	20,677	19,335	16,080	5,993	2,472	1,571	1,970
1927-28	158,194	76,715	29,146	82,672	21,814	25,847	16,240	4,885	2,700	1,405	1,854
1928-29	149,063	68,607	30,530	78,377	23,690	19,928	13,920	3,014	2,413	1,000	2,030
1929-30	122,036	68,683	37,209	50,004	28,060	15,910	12,860	2,060	3,002	1,718	3,228
1930-31	155,435	79,972	37,805	70,264	29,957	21,240	15,200	5,049	2,335	1,532	5,056
1931-32				82,672		11,018	15,120	2,565	1,966	1,107	5,723

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

<sup>1</sup> Excludes a few minor producing countries for which no statistics are available and which do not enter into world trade. No production figures for Germany are available.

<sup>2</sup> Figures of area harvested are not available for all years but over a 16-year period the harvested area averaged 10 per cent below the sown area.

<sup>3</sup> Flax and hemp.

TABLE 94.—*Flaxseed: Monthly marketings by farmers, as reported by about 3,500 mills and elevators, United States, 1921-22 to 1930-31*

Crop year	Percentage of year's receipts												
	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Season
1921-22	6.4	10.9	20.7	25.7	12.0	6.9	4.3	2.8	3.0	2.4	2.1	2.8	100.0
1922-23	2.5	13.4	27.6	27.3	11.4	5.9	4.7	3.0	2.7	2.3	1.6	1.6	100.0
1923-24	1.1	10.0	30.7	23.3	12.1	6.0	2.6	2.3	2.0	1.5	2.1	2.3	100.0
1924-25	.5	6.3	23.0	34.5	17.8	6.7	3.8	2.7	1.8	1.4	1.2	1.3	100.0
1925-26	1.1	11.1	34.3	23.5	12.4	5.6	2.7	2.0	1.8	1.5	1.9	2.1	100.0
1926-27	1.4	12.0	25.3	32.5	11.2	6.3	2.4	2.3	1.7	.9	1.7	2.1	100.0
1927-28	1.0	6.1	32.9	33.4	10.5	5.3	3.0	1.9	1.9	1.2	1.7	1.1	100.0
1928-29	1.1	7.2	31.1	35.3	11.6	5.3	2.1	1.2	1.4	1.0	1.5	1.2	100.0
1929-30	1.9	19.9	35.6	23.9	9.1	3.3	1.3	1.1	1.0	.8	1.0	1.1	100.0
1930-31	2.2	21.2	32.5	18.7	8.0	3.9	2.2	2.3	1.9	2.1	2.2	1.8	100.0

Bureau of Agricultural Economics.

TABLE 95.—Flax: Acreage and production in specified countries, average 1921-22 to 1925-26, annual 1928-29 to 1931-32

Country	Acreage				Seed production				Fiber production			
	Aver- age, 1921-22 to 1925-26	1928-29	1930-31	1931-32 <sup>1</sup>	Aver- age, 1921-22 to 1925-26	1928-29	1930-31	1931-32 <sup>1</sup>	Aver- age, 1921-22 to 1925-26	1928-29	1930-31	1931-32 <sup>1</sup>
NORTHERN HEMISPHERE												
NORTH AMERICA												
Canada.....	769,552	378,081	382,359	381,800	6,438	6,287	7,785	6,438	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
United States.....	2,165,400	2,638,000	3,047,000	3,732,000	17,877	19,028	15,910	21,240	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Total North America.....	2,934,952	3,016,081	3,429,359	4,113,800	24,315	25,042	17,670	26,309	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
EUROPE												
United Kingdom:	7,801	5,543	6,408	3,900	3,200	3,200	3,200	3,200	12,123	13,117	12,032	12,032
England and Wales.....	30,267	37,248	33,911	28,507	7,440	7,440	7,440	7,440	2,602	2,636	2,771	1,576
Northern Ireland.....	8,288	8,082	6,283	3,950	1,647	1,647	1,647	1,647	10,168	80,028	34,000	22,957
Irish Free State.....	5,661	8,855	1,322	1,322	324	324	324	324	10,004	47,496	32,499	18,234
Sweden.....	27,839	39,188	47,450	51,000	410	492	708	410	29,123	72,580	56,304	61,017
Netherlands.....	67,290	67,589	56,000	30,000	363	768	768	363	1,278	4,076	7,296	5,583
Belgium.....	45,608	83,703	86,460	74,278	87,826	87,826	87,826	87,826	1,278	4,076	7,296	5,583
France.....	3,846	1,337	1,337	1,337	1,337	1,337	1,337	1,337	2,433	16,416	16,606	12,694
Spain.....	51,700	43,660	28,000	27,132	24,470	451	201	201	28,397	22,230	20,728	12,816
Italy.....	9,065	11,633	12,100	8,000	44	44	44	44	5,237	2,784	7,912	80,918
Austria.....	56,438	50,171	47,000	31,000	349	349	349	349	18,465	15,154	20,533	22,788
Czechoslovakia.....	6,918	7,070	12,469	36,169	44,000	48	48	48	18,465	15,154	20,533	22,788
Hungary.....	33,179	31,100	34,000	17,000	17,000	17,000	17,000	17,000	4,107	3,978	5,991	5,991
Yugoslavia.....	635	591	722	2,000	2,000	2,000	2,000	2,000	4,107	3,978	5,991	5,991
Bulgaria.....	40,021	47,811	42,798	43,527	68,560	294	278	392	87,774	114,640	144,849	97,800
Rumania.....	229,360	281,889	289,480	262,042	1,758	2,413	3,092	2,335	62,119	76,200	74,913	64,188
Poland.....	144,860	235,500	201,000	133,000	1,168	1,000	1,718	1,532	48,964	32,275	48,347	42,395
Lithuania.....	132,076	169,800	137,880	128,000	104,000	783	411	783	22,187	17,195	21,498	23,745
Latvia.....	75,865	82,880	70,000	80,000	45,000	387	229	499	3,239	3,549	3,527	3,527
Estonia.....	14,761	13,578	12,000	14,000	10,000	15,025	23,690	23,690	644,969	716,936	816,804	944,904
Finland.....	2,799,900	4,285,668	5,074,446	5,551,027	7,735,000	15,025	23,690	23,690	316,301	361,977	408,581	315,884
Russia, incl. Asiatic.....	3,793,761	5,493,855	6,230,937	6,630,305	8,617,198	5,419	4,292	6,769	4,515	4,515	4,515	4,515
Total European countries report- ing all years, including Asiatic Russia.....	3,793,761	5,493,855	6,230,937	6,630,305	8,617,198	5,419	4,292	6,769	4,515	4,515	4,515	4,515

## NORTH AFRICA

Kenya.....	7, 154	284			19	437	400	448	734	1, 090		
Morocco.....	42, 000	42, 239	58, 048	67, 000	368	7	3	8		441		
Algeria.....	643	494	494		80	51	47					
Tunisia.....	6, 946	5, 752	5, 411		31	34	53	34		2, 090	1, 433	2, 792
Egypt.....	8, 181	2, 657	2, 659									1, 702
ASIA												
India.....	3, 216, 200	3, 311, 000	3, 109, 000	2, 802, 000	3, 020, 000	17, 624	13, 920	12, 880	15, 200	15, 120		
Japanese Empire:												
Japan.....	49, 911	19, 081	25, 950			304	93	121		61, 212	29, 632	38, 905
Chosen.....	3, 388	3, 987	3, 815							1, 141	1, 147	1, 082
Total Northern Hemisphere countries reporting all years.....	9, 949, 757	11, 866, 536	12, 811, 593	13, 804, 151	14, 944, 973	47, 730	42, 191	38, 019	44, 156	33, 922	310, 977	408, 581
Estimated Northern Hemisphere total.....	10, 030, 000	11, 904, 000	12, 856, 000	13, 848, 000		64, 150	69, 644	69, 377	83, 722		1, 110, 900	1, 227, 000
SOUTHERN HEMISPHERE												
Chile.....	913		768			16						
Uruguay.....	110, 279	192, 234	290, 676	401, 851	608, 000	1, 108	2, 030	3, 228	5, 050	5, 723		
Argentina.....	5, 224, 757	0, 585, 000	5, 231, 000	7, 292, 000	640, 000	52, 305	78, 377	50, 004	70, 264	82, 672		
Australia.....	394	289	865			2					7 53	
New Zealand.....	8, 003	2, 800	7, 766			121	46	141				
Total Southern Hemisphere countries reporting all years.....	5, 341, 046	6, 760, 234	5, 521, 679	7, 063, 851	210, 000	53, 533	80, 407	53, 232	75, 320	88, 395		
Total Northern and Southern Hemisphere countries reporting all years.....	15, 290, 793	18, 628, 770	18, 333, 271	21, 468, 000	23, 990, 973	101, 268	122, 598	91, 251	119, 476	122, 347	310, 301	361, 977
Estimated world total.....	15, 381, 000	18, 670, 000	18, 400, 000	21, 522, 000		117, 863	150, 000	122, 750	169, 185		1, 111, 700	1, 228, 700
											1, 384, 000	1, 490, 000

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Both acreage and production figures refer to the year of harvest. Harvest of the Northern Hemisphere are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

- 1 Preliminary.
- 2 For tax and hemp.
- 3 5-year average.
- 4 5-year average.
- 5 Where changes in territory have occurred averages are estimates for territory within present boundary.
- 6 Acreage figures are for area sown; figures of area harvested are not available for all years, but over a 10-year period the harvested area averaged 10 per cent below the sown area.
- 7 3-year average.
- 8 Excludes a few minor producing countries for which no statistics are available and which do not enter into world trade. No figures are included for Germany, whose acreage has decreased from 115,000 acres in 1922-23 to 10,000 acres in 1931-32. No production figures are available.

TABLE 96.—*Flaxseed: Receipts at Minneapolis, 1909-10 to 1931-32*

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Total
	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,300 bush.	1,000 bush.
1909-10.....	999	2,219	1,892	601	966	670	826	437	222	189	123	137	9,251
1910-11.....	854	1,530	1,262	535	338	300	232	112	118	122	133	191	5,757
1911-12.....	863	1,212	1,570	1,716	531	459	397	468	571	440	487	189	8,574
1912-13.....	700	1,657	1,520	2,245	1,450	1,248	1,057	742	518	514	432	281	12,362
1913-14.....	758	1,686	1,505	1,131	711	478	552	270	139	165	233	117	7,783
1914-15.....	901	1,890	1,247	1,016	599	443	384	142	77	148	239	115	7,199
1915-16.....	347	1,038	1,508	1,113	319	399	810	486	440	363	441	199	7,461
1916-17.....	316	2,380	1,694	1,045	544	442	441	384	263	565	325	92	8,491
1917-18.....	265	980	1,112	614	533	553	527	283	349	648	208	94	6,166
1918-19.....	536	915	857	788	558	473	829	439	438	942	642	190	7,611
1919-20.....	753	570	568	492	344	368	409	159	295	522	554	297	5,331
1920-21.....	580	1,444	861	699	298	269	364	434	578	572	338	289	6,726
1921-22.....	500	1,144	375	354	308	200	254	196	300	220	157	288	4,296
1922-23.....	909	1,121	580	577	447	249	319	478	401	481	359	1,019	6,938
1923-24.....	2,654	1,953	1,308	877	358	250	299	210	296	296	294	269	8,904
1924-25.....	2,265	3,475	2,781	1,375	1,244	750	671	374	402	442	288	1,094	15,159
1925-26.....	3,331	2,745	1,107	722	375	276	320	357	431	360	294	820	11,148
1926-27.....	1,539	2,905	1,103	689	415	318	273	169	257	277	145	441	8,511
1927-28.....	4,465	3,894	1,065	490	716	495	471	311	439	467	143	652	13,598
1928-29.....	3,454	3,689	1,278	601	373	322	325	255	244	330	180	1,249	12,310
1929-30.....	2,939	1,759	624	408	180	118	133	142	390	313	162	2,436	9,597
1930-31.....	2,295	1,213	912	472	401	368	449	359	355	511	154	2,110	9,599
1931-32.....	1,476	840	321	264									

Bureau of Agricultural Economics. Compiled from annual reports of the Minneapolis Chamber of Commerce.

TABLE 97.—*Flaxseed: Commercial stocks in store, 1926-27 to 1931-32*DOMESTIC FLAXSEED IN UNITED STATES<sup>1</sup>

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1926-27.....					2,684	2,328	2,089	2,014	1,834	1,396	1,445	909
1927-28.....	584	1,553	5,353	4,703	4,247	3,542	2,816	2,178	1,691	882	781	615
1928-29.....	317	704	2,721	1,343	1,397	1,142	780	681	547	398	434	370
1929-30.....	159	924	1,179	610	917	867	740	698	589	519	433	314
1930-31.....	467	1,903	2,202	1,431	1,371	1,357	1,273	1,205	972	784	786	672
1931-32.....	745	1,383	1,920	1,585								

CANADIAN FLAXSEED IN UNITED STATES<sup>2</sup>

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
1926-27.....					14	14	17	17	17	57	11	13
1927-28.....	0	0	1	12	17	18	18	0	0	0	0	1
1928-29.....	1	1	0	0	0	0	0	0	0	0	0	0
1929-30.....	0	0	0	0	0	0	0	0	0	0	0	0
1930-31.....	0	0	0	1	1	1	1	1	1	1	1	0
1931-32.....	0	0	0	0								

Bureau of Agricultural Economics. Compiled from weekly reports to the grain, hay, and feed market news service. Data are for stocks on the Saturday nearest the 1st day of the month.

<sup>1</sup> Includes flaxseed in store in public and private elevators in 42 important markets and also the flaxseed afloat in vessels or barges in the harbors of lake and seaboard ports. Flaxseed in transit either by rail or water, mill stocks, or small private stocks of flaxseed intended only for local purposes, not included.

<sup>2</sup> Includes flaxseed stored at lake and seaboard ports, exclusive of flaxseed in transit on lakes and canals.

TABLE 98.—*Flaxseed: International trade, average 1925-1929, annual, 1927-1930*

Country	Calendar year									
	Average 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
<b>PRINCIPAL EXPORT- ING COUNTRIES</b>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>
Argentina.....	63,699	0	74,555	0	76,547	0	63,677	0	48,047	0
British India.....	9,442	763	8,670	968	6,535	633	10,005	878	10,455	736
Canada.....	2,528	568	2,145	354	2,950	300	850	1,374	1,397	846
Uruguay.....	2,079	0	2,274	0	2,379	0	2,175	0	—	0
Lithuania.....	811	0	955	0	275	0	971	0	792	0
Latvia.....	644	560	577	512	379	706	604	683	425	300
Morocco.....	363	0	470	0	379	0	359	0	—	0
Eritrea <sup>2</sup> .....	188	0	178	0	107	0	20	0	—	0
China.....	117	0	221	0	10	0	1	0	23	0
Estonia.....	86	30	73	24	12	76	113	42	99	3
Rumania.....	60	0	107	0	16	—	—	—	—	—
Tunis.....	48	0	48	0	64	0	39	0	25	0
<b>Total.....</b>	<b>80,363</b>	<b>1,941</b>	<b>90,377</b>	<b>1,856</b>	<b>89,943</b>	<b>1,715</b>	<b>78,817</b>	<b>2,974</b>	<b>59,261</b>	<b>1,848</b>
<b>PRINCIPAL IMPORT- ING COUNTRIES</b>										
United States.....	0	20,540	0	21,821	0	17,579	0	24,243	0	12,662
Netherlands.....	208	13,640	148	14,312	164	18,451	264	14,106	200	10,029
Germany.....	80	13,602	67	16,715	67	17,439	148	12,109	47	9,274
United Kingdom.....	0	13,439	0	14,105	0	13,884	0	11,000	0	8,005
France.....	20	7,368	18	7,061	15	8,272	29	8,444	27	7,639
Belgium.....	301	4,051	219	3,637	326	5,003	373	4,162	121	2,931
Italy.....	1	2,350	0	2,578	0	2,588	2	2,554	0	2,096
Sweden.....	0	1,477	0	1,467	0	1,632	0	1,354	0	1,425
Australia <sup>3</sup> .....	0	957	0	825	0	797	0	1,498	—	—
Czechoslovakia.....	10	855	2	930	7	956	19	1,112	33	795
Denmark.....	0	696	0	357	0	857	0	576	0	613
Spain.....	3	663	14	823	0	918	0	748	0	719
Norway.....	0	602	0	572	0	618	0	578	0	637
Poland.....	275	522	61	552	317	851	573	818	54	207
Japan.....	1	464	0	363	0	681	2	626	0	221
Finland.....	0	222	0	197	0	241	0	314	0	141
Hungary.....	27	92	12	101	25	118	78	126	256	188
Austria.....	0	15	0	13	0	14	0	17	1	16
<b>Total.....</b>	<b>920</b>	<b>81,615</b>	<b>511</b>	<b>86,009</b>	<b>921</b>	<b>88,984</b>	<b>1,488</b>	<b>85,254</b>	<b>799</b>	<b>58,762</b>

Bureau of Agricultural Economics. Official sources except where otherwise noted.

<sup>1</sup> Preliminary.<sup>2</sup> International Yearbook of Agricultural Statistics.<sup>3</sup> 4-year average.<sup>4</sup> 3-year average.TABLE 99.—*Flaxseed: Estimated average price per bushel received by producers, United States, 1923-23 to 1931-32*

Crop year	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Weight- ed av- erage
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1922-23.....	189.1	199.4	211.0	217.8	229.9	245.4	261.6	279.5	273.1	245.4	228.8	210.4	209.5
1923-24.....	208.4	212.1	211.4	218.8	218.8	224.9	223.7	217.7	222.6	213.1	218.1	210.2	212.3
1924-25.....	201.2	210.8	222.7	235.8	271.8	275.3	267.8	244.7	251.8	216.8	227.6	229.5	220.7
1925-26.....	227.9	228.9	228.1	222.1	224.5	216.4	202.9	207.0	205.4	203.9	208.7	215.7	224.6
1926-27.....	211.3	197.5	195.5	196.4	193.0	195.7	193.1	106.1	205.7	204.7	198.4	203.7	205.8
1927-28.....	197.1	191.2	184.2	185.3	188.4	180.9	194.8	198.4	210.5	206.0	195.5	181.7	192.0
1928-29.....	181.6	198.1	198.1	205.4	211.1	218.4	219.2	216.4	214.7	217.0	233.2	259.5	206.7
1929-30.....	285.4	300.5	285.1	287.7	279.8	275.0	261.5	263.7	245.9	245.6	192.7	191.9	246.4
1930-31.....	168.1	152.2	133.6	137.6	131.7	126.2	130.4	128.6	129.9	120.1	132.6	120.4	146.8
1931-32.....	113.1	106.5	121.9	118.7	—	—	—	—	—	—	—	—	—

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices on 1st of month and 1st of succeeding month September, 1923-December, 1932.

TABLE 100.—*Flaxseed, No. 1: Average price per bushel, Minneapolis, 1899-1900 to 1931-32*

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Average
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1899-1900.....					145	155	159	168	175	175	163	135	
1900-01.....	149	170	171	162	165	160	164	168	175	175	185	160	166
1901-02.....	150	145	142	147	165	170	172	175	175	174	152	142	159
1902-03.....	131	120	118	119	119	115	112	110	114	107	97	97	113
1903-04.....	100	98	94	97	106	115	114	112	106	107	119	124	108
1904-05.....	122	114	116	123	123	127	139	139	142	147	147	142	132
1905-06.....	104	97	98	104	116	114	113	115	114	111	110	111	109
1906-07.....	110	111	117	119	120	122	119	116	123	125	118	114	118
1907-08.....	122	127	113	112	117	116	116	117	123	123	121	129	120
1908-09.....	123	122	138	145	156	164	164	165	172	177	159	142	152
1909-10.....	141	157	175	193	218	218	225	228	222	204	234	247	208
1910-11.....	266	262	261	242	260	268	260	256	247	224	210	234	249
1911-12.....	247	235	204	206	215	206	206	215	223	225	197	186	214
1912-13.....	176	160	135	125	129	134	126	129	130	131	138	147	138
1913-14.....	145	138	135	144	149	153	158	154	156	159	168	164	152
1914-15.....	151	133	145	154	153	186	191	193	195	176	167	167	170
1915-16.....	170	186	199	207	231	232	227	213	196	180	196	215	204
1916-17.....	211	254	273	284	289	261	290	318	333	311	301	246	291
1917-18.....	338	316	329	340	360	374	408	409	393	386	440	439	378
1918-19.....	409	359	377	354	341	345	375	398	412	436	594	587	419
1919-20.....	492	432	453	499	512	509	502	468	463	392	348	323	452
1920-21.....	323	283	227	206	196	182	178	158	184	188	189	201	209
1921-22.....	203	181	181	189	213	246	257	270	250	250	259	229	219
1922-23.....	225	238	218	262	280	304	307	340	294	280	270	234	258
1923-24.....	238	248	212	246	250	258	219	247	246	244	247	244	244
1924-25.....	226	210	258	284	315	312	297	279	280	268	249	254	263
1925-26.....	259	258	256	261	250	243	232	234	230	233	244	238	252
1926-27.....	233	241	223	224	223	225	222	224	234	225	223	222	224
1927-28.....	221	213	213	215	224	227	233	236	246	238	221	205	220
1928-29.....	209	228	235	239	245	255	249	245	245	248	276	279	253
1929-30.....	323	332	324	322	308	305	282	292	298	271	232	200	292
1930-31.....	190	180	165	161	157	156	158	157	165	148	164	141	165
1931-32.....	137	132	146	143									

Bureau of Agricultural Economics. The figures shown for 1899-1920 are averages of daily closing prices compiled from annual reports of the Minneapolis Chamber of Commerce; 1921 to date are averages of daily prices weighted by car-lot sales, compiled from Minneapolis Daily Market Record.

TABLE 101.—*Linseed oil: Flaxseed crushed and quantity of oil produced, United States, 1919-20 to 1930-31*

Year beginning October	Flaxseed crushed					Oil produced				
	October- December	January- March	April- June	July- September	Total	October- December	January- March	April- June	July- September	Total
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
1919-20.....	7,694	6,336	6,407	6,542	26,969	139,960	117,226	121,407	126,138	504,731
1920-21.....	6,341	6,343	6,332	5,812	24,828	120,502	118,787	118,887	107,716	465,892
1921-22.....	7,589	6,713	3,441	5,583	23,276	137,528	124,941	70,239	102,681	435,289
1922-23.....	8,602	8,292	8,689	8,223	33,806	159,753	155,148	178,207	154,588	648,756
1923-24.....	8,970	9,575	9,434	7,550	35,529	165,560	177,583	176,187	139,862	659,102
1924-25.....	11,530	12,516	9,128	7,822	40,996	211,954	229,544	169,980	140,306	757,784
1925-26.....	11,798	10,651	7,767	9,500	39,716	217,992	194,607	144,950	174,057	731,606
1926-27.....	11,085	11,037	8,963	9,051	40,138	206,496	202,162	167,232	169,274	745,164
1927-28.....	12,699	11,885	9,608	7,603	41,795	238,046	232,751	179,532	141,889	793,218
1928-29.....	11,191	10,839	9,962	10,321	42,313	206,273	202,353	187,019	191,977	787,622
1929-30.....	9,947	7,968	7,270	5,887	31,070	182,228	145,970	130,863	108,236	567,297
1930-31 <sup>1</sup> .....	7,391	6,571	7,205	7,610	28,777	131,257	118,417	130,635	141,205	521,514

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census, "Animal and vegetable fats and oils."

<sup>1</sup>Preliminary.

# STATISTICS OF GRAINS

647

TABLE 102.—*Linseed oil: International trade, average 1925-1929, annual 1927-1930*

Country	Calendar year									
	Average, 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORT- ING COUNTRIES	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Netherlands.....	158,136	833	150,621	579	155,920	1,187	172,702	1,320	172,024	913
United Kingdom.....	49,400	47,546	44,628	47,815	49,327	50,165	44,925	69,418	35,157	97,442
Belgium.....	23,497	2,308	21,010	760	24,453	2,123	28,806	2,444	29,825	1,214
Sweden.....	1,267	668	1,189	500	1,436	580	1,751	912	1,435	312
Total.....	232,300	51,356	217,448	49,714	231,142	54,055	249,184	74,594	237,941	99,911
PRINCIPAL IMPORT- ING COUNTRIES										
Germany.....	8,343	43,213	5,525	44,057	10,342	29,188	14,277	42,216	0,267	33,931
Switzerland.....	27	13,285	4	14,234	73	14,771	27	13,941	49	12,981
Brazil.....	0	9,558	0	8,666	0	10,204	0	6,909	0	5,737
Austria.....	459	8,996	629	8,937	510	10,455	363	9,143	159	9,104
France.....	4,469	8,195	4,400	5,666	4,829	7,033	5,687	3,546	12,018	5,954
United States.....	2,360	7,949	2,525	946	1,965	173	2,208	9,961	1,592	2,125
Finland.....	0	5,380	0	5,954	0	6,507	0	4,795	0	5,843
Dutch East Indies.....	0	5,161	0	5,034	0	5,505	0	5,753	0	3,387
Australia.....	25	4,968	10	4,575	19	5,186	18	3,031		
Egypt.....	3	4,935	2	4,825	1	5,054	2	4,686		1,154
Union of South Af- rica.....	0	4,770	0	4,239	0	5,082	0	5,014	0	4,441
Hungary.....	12	4,202	15	6,398	1	5,700	0	1,263	989	1,192
New Zealand.....	2	3,789	0	2,849	0	3,667	0	3,521	0	2,892
Italy.....	331	3,574	427	4,227	165	7,446	203	3,455	244	2,210
Norway.....	54	3,314	17	3,148	28	3,191	168	4,312		1,703
Chile.....	0	2,712	0	2,639	0	2,533	0	3,474	0	2,605
British India.....	727	2,062	547	1,885	576	2,392	1,259	1,574	922	1,575
Denmark.....	419	2,061	314	1,972	1,197	2,379	441	2,271	3	2,424
British Malaya.....	126	1,550	108	1,501	110	1,961	177	1,579	86	1,390
Bulgaria.....	0	1,484	0	1,382	0	1,604	0	1,520	0	1,354
Yugoslavia.....	52	1,390	8	1,738	11	1,633	4	1,080	0	1,028
Czechoslovakia.....	267	1,369	40	1,068	31	1,111	1,155	1,575	514	978
China.....	0	1,242	0	801	0	1,520	0	1,476	0	803
Philippine Islands.....	0	1,210	0	1,155	0	1,560	0	1,638	0	1,621
Canada.....	49	819	53	738	53	734	18	1,342	33	1,109
Argentina.....	265	743	238	587	128	653	65	746	35	646
Tunis.....	0	668	0	629	0	702	0	783	0	912
Greece.....	481	419		280	0	452		301		263
Total.....	18,061	149,065	14,863	140,250	20,045	138,186	26,072	139,758	25,931	109,052

Bureau of Agricultural Economics. Official sources except where otherwise noted. Conversions made on the basis of 7.5 pounds to the gallon.

<sup>1</sup> Preliminary.

<sup>2</sup> Java and Madura only.

<sup>3</sup> International Yearbook of Agricultural Statistics.

<sup>4</sup> 2-year average.

TABLE 103.—*Linseed oil, raw: Average car-lot price per gallon in barrels, New York, 1922-23 to 1931-32*

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Average
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1922-23.....	88	89	88	89	89	95	102	116	115	112	104	97	99
1923-24.....	90	94	92	92	92	91	93	90	94	94	98	102	94
1924-25.....	102	102	106	110	117	118	111	104	105	106	98	102	107
1925-26.....	103	109	96	95	87	85	80	81	81	84	89	90	89
1926-27.....	83	81	81	80	79	78	77	81	84	84	80	80	81
1927-28.....	77	74	73	72	74	74	74	74	78	77	75	73	75
1928-29.....	74	76	77	75	75	76	76	76	77	79	82	96	79
1929-30.....	116	118	111	110	105	105	105	105	105	105	104	97	107
1930-31.....	78	74	70	69	66	69	71	68	66	64	68	63	69
1931-32.....	57	55	56	53									

Bureau of Agricultural Economics. Compiled from Oil, Paint, and Drug Reporter, average of weekly ranges. Data for 1910-11 to 1921-22 are available in the 1930 Yearbook, p. 666, Table 103.

<sup>1</sup> Beginning October, 1923, prices are quoted on pound basis and have been converted to price per gallon by multiplying by 7.5.

TABLE 104.—*Linseed meal: Average wholesale price per ton, Minneapolis, 1922-23 to 1931-32*

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Average
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1922-23	43.32	50.46	63.65	54.88	57.62	55.23	49.19	47.00	45.81	41.88	43.84	49.28	49.35
1923-24	52.21	52.78	50.92	49.76	49.31	45.74	45.10	43.20	42.58	44.44	47.16	48.73	47.66
1924-25	48.08	50.00	48.86	50.58	51.31	49.91	45.08	43.68	45.96	47.63	47.98	49.08	48.18
1925-26	47.78	46.96	47.35	48.72	50.09	52.70	50.87	52.44	53.60	50.69	50.86	49.54	50.09
1926-27	47.83	46.56	46.11	46.91	47.76	48.12	51.31	51.82	50.84	49.12	48.00	48.72	48.59
1927-28	49.50	48.46	48.00	48.00	50.92	52.00	53.30	54.06	57.44	55.33	52.82	49.17	51.58
1928-29	49.75	57.33	59.00	61.43	60.85	63.29	61.29	58.52	58.99	55.39	56.31	56.31	58.20
1929-30	59.67	60.00	59.31	58.66	57.66	55.80	54.01	58.56	52.41	48.48	46.44	45.69	54.72
1930-31	45.75	43.53	42.45	42.06	40.12	38.50	34.98	34.07	31.41	27.96	29.08	29.77	36.66
1931-32	28.49	28.56	33.92	34.40									

Bureau of Agricultural Economics. Compiled from the Minneapolis Daily Market Record. Prices are simple averages of daily quotations. Data for 1909-10 to 1921-22 are available in the 1930 Yearbook, p. 967, Table 104.

TABLE 105.—*Rice, rough: Acreage, production, value, exports, etc., United States, 1909-1931*

Year	Acreage	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value, basis Dec. 1 farm price	Foreign trade, mostly cleaned rice, but including rice bran, meal, and broken rice, reduced to rough basis, year beginning July <sup>1</sup>				
						Domestic exports	Shipments from United States to Alaska, Hawaii, and Porto Rico	Imports	Net balances <sup>2</sup>	
	<i>1,000 acres</i>	<i>Bushels of 45 lbs.</i>	<i>1,000 bushels</i>	<i>Cents</i>	<i>1,000 dollars</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>
1909	610	55.8	21,839							
1909	610	33.8	20,607	79.5	16,392	964	4,276	8,114	-2,581	
1910	723	33.9	24,510	67.8	16,624	1,082	4,606	7,516	-1,605	
1911	696	32.9	22,934	79.7	18,274	1,420	4,890	6,842	-157	
1912	723	34.7	25,054	98.5	23,423	1,401	4,806	7,996	-1,332	
1913	827	31.1	25,744	85.8	22,090	807	5,244	10,447	-3,766	
1914	694	34.1	23,649	92.4	21,849	2,789	4,640	9,979	-419	
1915	803	36.1	28,947	90.6	26,212	4,391	5,191	9,516	+2,651	
1916	869	47.0	40,881	88.9	36,311	6,529	5,818	7,778	+6,167	
1917	981	35.4	31,739	189.6	65,879	7,069	4,878	16,418	-1,148	
1918	1,119	34.5	38,606	191.8	74,042	6,953	5,995	13,094	+7,638	
1919	811	58.8	35,551							
1919	1,063	39.5	41,985	206.6	111,913	17,402	5,547	6,477	+19,048	
1920	1,326	39.0	52,066	119.1	62,036	15,871	6,814	3,485	+21,217	
1921	921	40.8	37,612	95.2	35,802	19,494	7,179	2,650	+25,952	
1922	1,054	39.2	41,405	93.1	38,562	13,341	8,290	2,503	+20,308	
1923	895	37.7	33,717	110.2	37,150	8,199	9,094	1,376	+16,416	
1924	850	39.7	29,629							
1924	883	37.9	32,206	138.6	44,644	4,033	8,162	2,076	+10,687	
1925	1,084	37.7	38,249	153.8	51,142	1,734	8,049	4,747	+5,535	
1926	1,008	41.1	42,477	109.6	46,544	10,957	8,743	2,558	+17,587	
1927	1,008	44.6	44,754	92.9	41,398	11,152	9,183	1,538	+19,035	
1928	860	45.4	43,440	85.5	38,456	14,137	10,131	1,225	+23,403	
1929	959	47.2	40,604	100.2	40,666	10,423	10,342	1,124	+19,795	
1930	970	46.2	44,299	78.2	34,681	10,116	11,864	1,278	+20,829	
1931 <sup>3</sup>		46.4	45,014	80.9	27,402					

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board; italic figures are census returns. See 1927 Yearbook, p. 819, for data for earlier years.

<sup>1</sup>Compiled from Commerce and Navigation of the United States, 1900-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1929; January and June issues, 1927-1931, and official records of the Bureau of Foreign and Domestic Commerce.

<sup>2</sup>The difference between the total exports (domestic exports plus reexports plus shipments to Alaska, Hawaii, and Porto Rico) and total imports. Net exports indicated by +; net imports indicated by -.

<sup>3</sup>Preliminary.

## STATISTICS OF GRAINS

649

TABLE 106.—*Rice, rough: Acreage and production, by States, average 1924-1928, annual 1928-1931*

State and division	Acreage					Production				
	Average, 1924-1928	1928	1929	1930	1931 <sup>1</sup>	Average, 1924-1928	1928	1929	1930	1931 <sup>1</sup>
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
Arkansas.....	175	164	156	172	177	8,047	7,823	7,978	8,170	9,381
Louisiana.....	472	457	475	491	471	16,914	18,870	18,832	19,104	17,104
Texas.....	160	173	144	153	197	6,072	8,170	7,103	9,709	10,412
United States, except California.....	807	814	765	849	845	31,693	34,820	34,391	37,028	37,071
California.....	127	132	95	110	126	6,876	8,171	6,213	7,271	5,670
United States.....	934	946	860	959	970	38,569	43,010	40,604	44,299	42,741

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.TABLE 107.—*Rice, in terms of clean rice: World production, 1909-10 to 1931-32*

Crop year	Estimated world production, exclusive of China	Production in selected countries <sup>1</sup>							
		India	Japan	Indo-China	Java and Madura <sup>2</sup>	Siam <sup>3</sup>	Chosen	Philippines	United States
	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds
1909-10.....	107,000	63,869	10,474	.....	5,724	3,731	2,343	1,164	572
1910-11.....	103,000	64,552	14,050	.....	5,738	3,470	3,290	1,207	681
1911-12.....	109,000	63,943	16,246	.....	6,170	4,533	3,634	1,717	637
1912-13.....	109,000	63,802	15,778	6,814	5,812	4,561	3,413	1,512	606
1913-14.....	113,000	64,555	15,789	8,051	6,440	4,994	3,804	1,404	715
1914-15.....	113,000	61,109	17,909	9,521	6,339	4,708	4,439	1,100	657
1915-16.....	124,000	73,315	17,569	7,921	6,471	4,786	4,036	1,269	804
1916-17.....	129,000	78,321	18,363	6,733	6,409	5,011	4,377	1,745	1,135
1917-18.....	132,000	80,559	17,143	6,313	6,712	5,133	4,261	2,210	963
1918-19.....	108,000	54,466	17,184	6,302	6,831	4,642	4,765	2,065	1,072
1919-20.....	123,000	71,734	19,107	6,532	7,435	3,114	3,974	2,243	1,166
1920-21.....	117,000	61,949	19,857	6,234	6,250	3,668	4,639	2,560	1,446
1921-22.....	127,000	74,240	17,335	7,981	5,625	3,806	4,500	2,631	1,445
1922-23.....	133,000	75,495	19,067	7,629	6,864	3,954	4,717	2,703	1,150
1923-24.....	115,000	63,164	17,418	7,206	6,852	6,034	4,707	2,506	937
1924-25.....	127,000	69,001	17,900	7,801	7,077	6,779	4,153	2,818	885
1925-26.....	127,000	68,551	18,756	7,931	6,677	5,752	4,641	2,649	924
1926-27.....	126,000	66,488	17,465	8,255	7,173	7,109	4,807	3,063	1,190
1927-28.....	127,000	63,244	19,510	8,850	7,272	6,261	5,435	3,062	1,343
1928-29.....	130,000	72,006	18,945	7,811	7,006	6,325	4,245	3,073	1,207
1929-30 <sup>4</sup> .....	127,000	69,733	18,709	8,095	6,853	5,315	4,304	3,154	1,124
1930-31 <sup>4</sup> .....	134,000	70,771	20,516	7,990	7,221	6,620	6,026	2,925	1,231
1931-32 <sup>4</sup> .....	.....	.....	17,346	.....	7,540	.....	4,949	.....	1,250

Bureau of Agricultural Economics. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere countries are combined with those of the Southern Hemisphere which immediately follow; thus, for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931. Estimates of world rice production for the period 1900-1901 to 1909-10 appear in *Agriculture Yearbook, 1924*, p. 663.

<sup>1</sup> China is an important producing country, but official statistics are not available.<sup>2</sup> Irrigated rice.<sup>3</sup> Estimated figures obtained by multiplying acreage under rice as classified for revenue purposes up to 1912-13, and acreage as reported by the Department of Land and Agriculture from 1912-13 on by an average yield for the years 1920-21 to 1923-24, for which years official estimates have been published of acreage, yield, and total production.<sup>4</sup> Preliminary.

TABLE 108.—*Rice: Acreage, yield per acre, and production in specified countries, average 1921-22 to 1925-26, annual 1928-29 to 1931-32*

Country	Acreage					Yield per acre					Production, in terms of cleaned rice				
	Average, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32	Average, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32	Average, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	Pounds	Pounds	Pounds	Pounds	Pounds	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds
<b>NORTHERN HEMISPHERE</b>															
United States.....	921	956	860	939	970	1,075	1,263	1,312	1,284	1,249	990	1,207	1,198	1,231	1,200
Mexico.....	155	112	87	90	90	1,811	1,009	1,067	1,153	1,133	77	113	92	102	102
Hawaii.....	3	3									18	10			
<b>Central America, South America, and West Indies:</b>															
Guatemala.....	6	8	5								8	2	8		
Salvador.....	13	16	14			278	125				117	16			
Costa Rica.....	18	48				600	478				46	2			
Colombia.....	42	66	63	60		1,150	1,444	1,460	1,417		62	81	82	85	
British Guiana.....	45	40					600				14	24	32	38	
Dutch Guiana.....											3	4			
Trinidad and Tobago.....	8	7		9							3				
<b>Europe:</b>															
Spain.....	116	121	119	120	113	8,270	8,289	8,471	8,542	8,204	876	888	413	425	362
Portugal.....	18	32	34	36	37	1,222	844	912	944		22	27	31	34	
Italy.....	816	833	839	861	846	2,807	2,680	2,705	2,452	2,483	759	869	917	885	869
Yugoslavia.....	4	4	4	4	4						3	3	3	3	
Bulgaria.....	11	18	22	17	14		1,278	1,273	1,412		14	23	28	24	19
<b>French West Africa:</b>															
French Guinea.....	2,008	1,977				551	551				1,106	1,089			
French Senegal.....	119	111	77	74		546	532	597	595		65	69	46	44	
Upper Volta.....	44	13				136					6	8		6	
Sierra Leone.....	890	287	287	287	287	797	1,186	1,186	1,256		811	352	352	373	
Egypt.....	192	264	327	359		1,586	1,731	1,722	1,099		265	467	603	610	
<b>Asia:</b>															
India.....	81,400	83,273	80,479	81,986	81,209	863	865	866	868		70,270	72,005	69,793	70,771	
Andaman and Nicobar.....	3	4									2	2	4		
British North Borneo.....	62	77	70	59		677	597	480			42	46	54		
Brunei.....	3	5									2	2	2		
French establishments in India.....	45	47				644	574	729			29	27	36		
<b>Japanese Empire:</b>															
Japan.....	7,705	7,822	7,848	7,940		2,850	2,422	2,384	2,384		18,107	18,945	18,709	20,516	17,846
Chosen (Korea).....	3,824	3,720	4,000	4,073	4,100	1,191	1,141	1,076	1,076		4,566	4,245	4,304	4,999	
Taiwan (Formosa).....	1,262	1,447	1,408	1,518		1,884	1,475	1,451	1,625		1,747	2,135	2,086	2,315	
Kwantung.....	3	2		2							3	3			
French Indo-China.....	11,949	13,722	13,839	14,845		645	569	533	557		7,704	7,811	8,095	7,990	
Siam.....	5,964	5,835	6,041	7,189		1,017	903	880	921		6,065	5,325	5,315	6,020	
Federated Malay States.....	197	175				629	600	735			124	106			



TABLE 109.—*Rice, rough: Yield per acre, average 1919-1923 and annual 1926-1931, and estimated price per bushel December 1, average 1925-1929 and annual 1926-1931, by States*

State	Yield per acre							Estimated price per bushel Dec. 1						
	Average, 1919-1923	1926	1927	1928	1929	1930	1931	Average, 1925-1929	1926	1927	1928	1929	1930	1931
Ark.....	Bus. 46.6	Bus. 53.0	Bus. 44.0	Bus. 47.7	Bus. 51.0	Bus. 47.5	Bus. 53.0	Cts. 104	Cts. 100	Cts. 90	Cts. 86	Cts. 94	Cts. 78	Cts. 61
La.....	35.6	32.5	40.0	38.8	40.5	39.0	36.5	107	105	87	90	100	76	63
Tex.....	38.9	41.5	48.6	50.0	52.8	52.2	53.0	106	110	86	88	103	79	61
Calif.....	54.0	53.6	56.0	61.9	65.4	66.1	64.0	122	131	115	88	105	83	56
U. S. <sup>1</sup> .....	40.5	41.3	44.6	45.4	47.2	46.2	46.4	109.0	109.6	92.9	88.5	100.2	78.2	60.9

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Prior to 1929, 5 States, including Missouri.TABLE 110.—*Rice, rough: Receipts at mills in Texas, Louisiana, Arkansas, and Tennessee, by months, 1922-23 to 1931-32*

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
	1,000 bbls.	1,000 bbls.	1,000 bbls.	1,000 bbls.	1,000 bbls.	1,000 bbls.	1,000 bbls.	1,000 bbls.	1,000 bbls.	1,000 bbls.	1,000 bbls.	1,000 bbls.
1922-23.....	340	909	1,913	1,780	1,272	952	392	396	529	137	185	104
1923-24.....	177	394	1,512	1,911	966	1,076	580	370	80	14	9	6
1924-25.....	298	949	2,182	1,905	973	448	197	43	34	11	45	8
1925-26.....	457	853	925	1,131	1,672	1,019	477	210	194	119	106	74
1926-27.....	188	1,147	1,681	1,253	1,053	818	648	621	372	396	430	147
1927-28.....	530	1,167	1,719	1,266	831	853	805	942	620	352	130	17
1928-29.....	180	1,197	2,113	1,936	947	621	592	439	429	232	191	126
1929-30.....	584	1,388	2,330	1,416	797	870	961	284	146	172	48	21
1930-31.....	508	1,084	2,063	1,257	844	1,147	864	601	566	520	323	172
1931-32.....	228	1,442	1,810									

Bureau of Agricultural Economics. Compiled from monthly reports of the Rice Millers' Association.

TABLE 111.—*Rice, Blue Rose, clean: <sup>1</sup> Average wholesale price per 100 pounds, New Orleans, 1922-23 to 1931-32*

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1922-23.....	4.10	4.25	3.62	3.82	4.00	4.06	3.94	3.91	4.00	3.56	3.75	3.94	3.91
1923-24.....	3.78	4.00	4.88	4.68	4.38	4.62	4.69	5.06	5.06	5.88	6.12	6.19	4.94
1924-25.....	5.88	5.69	5.12	5.50	6.10	6.30	6.50	6.38	6.34	6.50	6.81	6.88	6.17
1925-26.....	6.62	6.31	5.69	6.34	6.41	6.31	6.59	6.25	6.19	5.60	5.94	5.94	6.18
1926-27.....	4.94	5.62	4.81	4.44	4.38	4.50	4.19	4.34	4.06	4.12	4.52	4.22	4.51
1927-28.....	4.12	4.12	3.84	3.62	3.69	3.75	3.66	3.62	3.70	4.12	4.28	4.12	3.87
1928-29.....	4.12		3.91	3.81	3.94	4.12	3.88	3.88	3.88	3.75	3.81	3.94	
1929-30.....	4.25	3.72	3.78	3.88	3.84	4.00	4.12	4.31	4.31	4.56	4.31	4.31	4.12
1930-31.....	4.06	4.12	3.75	3.50	3.46								
1931-32.....													

Bureau of Agricultural Economics. Compiled from annual reports of the New Orleans Board of Trade.

<sup>1</sup> The term "clean" is equivalent to "milled."

# STATISTICS OF GRAINS

653

TABLE 112.—*Rice, including flour, meal, and broken rice: International trade, average 1925-1929, annual 1927-1930*

Country	Calendar year									
	Average 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
<b>PRINCIPAL EXPORT- ING COUNTRIES</b>	<i>Million pounds</i>	<i>Million pounds</i>	<i>Million pounds</i>	<i>Million pounds</i>	<i>Million pounds</i>	<i>Million pounds</i>	<i>Million pounds</i>	<i>Million pounds</i>	<i>Million pounds</i>	<i>Million pounds</i>
British India.....	4,888	224	5,005	148	4,024	553	4,600	194	5,862	160
Indo-China.....	3,435	0	3,619	0	3,885	0	2,921	0		0
Siam.....	3,101	1	3,820	0	3,289	0	2,514	0	2,210	
Italy.....	438	3	579	2	424	6	431	6	465	13
United States.....	252	60	310	48	379	37	395	31	259	28
Spain.....	115	0	117	0	131	0	88	0	125	0
Egypt.....	103	59	83	33	169	31	163	36	112	25
Madagascar.....	42	0	23	0	25	0	16	0	14	0
<b>Total.....</b>	<b>12,374</b>	<b>347</b>	<b>13,556</b>	<b>231</b>	<b>12,326</b>	<b>627</b>	<b>11,117</b>	<b>267</b>	<b>9,050</b>	<b>226</b>
<b>PRINCIPAL IMPORT- ING COUNTRIES</b>										
China.....	6	2,024	11	2,812	4	1,688	4	1,443	4	2,652
British Malaya.....	622	1,960	693	2,185	659	2,091	545	2,079	490	2,106
Dutch East Indies.....	51	1,308	33	1,037	30	1,289	28	1,621	* 23	1,548
Ceylon.....	0	1,045	0	1,051	0	1,081	0	1,100		1,079
Japan.....	14	961	12	1,300	9	623	8	401	97	397
Germany.....	325	848	294	757	280	853	356	658	159	550
France.....	169	532	170	486	256	631	217	562	190	534
Cuba.....	0	461	0	436	0	514	0	453	0	443
Netherlands.....	224	272	203	262	187	225	211	247	216	242
United Kingdom.....	15	299	17	267	14	250	13	258	14	247
Philippine Islands.....	1	147	2	28	2	97	1	232	1	24
Argentina.....	0	139	0	154	0	117	0	146	0	159
Russia.....	0	132	0	149		124		103		
Mauritius.....	0	129	0	131	0	141	0	121	0	114
Czechoslovakia.....	0	112	0	120	0	116	0	107	0	98
Belgium.....	4	92	4	101	4	102	5	87	1	105
Austria.....	0	59	0	59	0	62	0	63	0	61
Dominican Repub- lic.....	0	58	0	68	0	63	0	61	0	48
Yugoslavia.....	0	55	0	54	0	71	0	56	0	47
Greece.....	0	52	0	55	0	53	0	55	0	54
Chile.....	0	48	0	44	0	47	0	44	0	52
Canada.....	1	43	1	43	0	47	2	42	1	43
Australia.....	0	40	0	46	0	21	0	45	0	
Brazil.....	14	36	37	0	2	5	15	2	84	2
Finland.....	0	36	0	31	0	44	0	37	0	17
Denmark.....	0	24	0	23	0	25	0	27	0	22
Gambia.....	0	18	0	18	0	26	0	20	0	
Barbados.....	0	15	0	18	0	14	0	17	0	
Algeria.....	2	13	2	18	1	13	2	10	1	11
Hungary.....	3	12	5	7	3	5	3	5	1	7
<b>Total.....</b>	<b>1,453</b>	<b>10,933</b>	<b>1,484</b>	<b>11,760</b>	<b>1,451</b>	<b>10,508</b>	<b>1,310</b>	<b>10,102</b>	<b>1,282</b>	<b>9,602</b>

Bureau of Agricultural Economics. Official sources except where otherwise noted. Mostly cleaned rice. Under rice is included paddy, unhulled, rough, cleaned, polished, broken, and cargo rice, in addition to rice flour and meal. Rice bran is not included. Rough rice, or paddy, where specifically reported, has been reduced to terms of cleaned rice at the ratio of 162 pounds of rough or unhulled to 100 pounds of cleaned. "Rice, other than whole or cleaned rice," in the returns of the United Kingdom is not considered paddy, since the chief sources of supply indicate that it is practically all hulled rice. Cargo rice, a mixture of hulled and unhulled, is included without being reduced to terms of cleaned. Broken rice and rice flour and meal are taken without being reduced to terms of whole cleaned rice.

<sup>1</sup> Preliminary.

<sup>2</sup> Year ending Mar. 31 of following year.

<sup>3</sup> Java and Madura only.

<sup>4</sup> International Yearbook of Agricultural Statistics.

<sup>5</sup> 3-year average.

TABLE 113.—*Buckwheat: Acreage, production, value, exports, etc., United States, 1919-1931*

Year	Acreage	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value, basis Dec. 1 farm price	Foreign trade, including flour, year beginning July 1		
						Domestic exports	Imports	Net balance *
	1,000 acres	Bushels of 48 lbs.	1,000 bushels	Cents	1,000 dollars	1,000 bushels	1,000 bushels	1,000 bushels
1919.....	748	17.1	12,890					
1919.....	743	17.3	12,827	145.9	17,984	245	180	+85
1920.....	714	16.7	11,924	127.3	15,153	399	596	+63
1921.....	638	18.5	11,777	80.9	9,532	485	113	+372
1922.....	726	16.2	11,776	88.2	10,385	172	286	-114
1923.....	692	16.9	11,662	93.2	10,870	92	322	-230
1924.....	717	16.8	12,004					
1924.....	737	17.0	12,505	102.4	12,806	191	546	-355
1925.....	742	16.9	12,540	85.6	11,116	79	88	-9
1926.....	683	16.2	11,079	88.1	9,764	66	86	-20
1927.....	758	16.8	12,766	82.9	10,583	554	74	+480
1928.....	672	15.0	10,069	84.7	8,727	229	79	+150
1929.....	627	13.9	8,693	96.9	8,426	22	171	-149
1930.....	678	12.2	8,262	83.5	5,814	85	426	-311
1931 <sup>1</sup> .....	502	17.7	8,875	42.4	3,765			

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text; italic figures are census returns. See 1927 Yearbook, p. 825, for data for earlier years.

<sup>1</sup> Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1926; January and June issues, 1927-1931 and official records of the Bureau of Foreign and Domestic Commerce. Buckwheat—imports for consumption, 1909-1924—general imports, 1925-1930; buckwheat flour imports for consumption 1909-1930. Buckwheat flour converted to terms of grain on the basis that 1 barrel of flour is the product of 7 bushels of grain.

\* The difference between total exports (domestic exports plus reexports) and total imports. Net exports indicated by +; net imports indicated by -.

<sup>1</sup> Preliminary.

TABLE 114.—*Buckwheat: Acreage harvested and production, by States, average 1924-1928, annual 1928-1931*

State and division	Acreage harvested					Production				
	Aver., 1924-1928	1928	1929	1930	1931 <sup>1</sup>	Aver., 1924-1928	1928	1929	1930	1931 <sup>1</sup>
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
Maine.....	13	11	12	10	9	297	242	246	180	158
Vermont.....	2	2	2	2	2	47	48	38	38	36
New York.....	199	171	175	186	158	3,544	2,650	2,625	2,853	2,844
New Jersey.....	2	1	1	1	1	39	20	18	18	21
Pennsylvania.....	201	176	172	167	162	3,767	2,992	2,580	1,754	3,483
North Atlantic.....	417	361	362	366	332	7,694	5,952	5,507	4,873	6,542
Ohio.....	25	25	32	24	24	444	462	480	336	480
Indiana.....	14	12	15	14	13	178	150	198	182	234
Illinois.....	5	5	5	4	4	76	70	75	48	50
Michigan.....	45	38	34	18	18	574	513	320	135	190
Wisconsin.....	24	23	20	19	11	318	288	240	209	110
Minnesota.....	80	88	57	51	31	911	924	570	459	264
Iowa.....	7	6	9	4	3	103	60	121	52	25
Missouri.....	1	1	1	1	1	11	9	10	11	10
North Dakota.....	14	21	15	15	9	186	304	111	60	54
South Dakota.....	18	28	22	11	6	223	336	198	77	30
Nebraska.....	1	1	1	1	1	11	10	9	7	8
North Central.....	294	248	211	163	121	3,063	3,126	2,332	1,576	1,448
Delaware.....	2	1	1	1	1	18	12	13	8	13
Maryland.....	7	7	7	7	7	147	135	129	98	154
Virginia.....	17	20	14	12	13	237	270	186	106	196
West Virginia.....	28	25	23	17	20	506	450	409	212	410
North Carolina.....	6	5	5	4	4	85	68	63	48	00
South Atlantic.....	61	58	50	41	45	992	933	805	474	838
Kentucky.....	4	3	2	2	2	46	30	21	14	25
Tennessee.....	2	2	2	2	2	27	28	27	25	27
South Central.....	6	5	4	4	4	73	58	48	39	52
United States.....	718	672	627	573	502	11,792	10,069	8,692	6,962	8,875

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

<sup>1</sup> Preliminary.

TABLE 115.—*Buckwheat: Yield per acre, average 1919-1928 and annual 1926-1931, and estimated price per bushel December 1, average 1925-1929, and annual 1926-1931, by States*

State and division	Yield per acre							Estimated price per bushel Dec. 1						
	Av. 1919- 1928	1926	1927	1928	1929	1930	1931	Average, 1925- 1929	1926	1927	1928	1929	1930	1931
	<i>Bus.</i>	<i>Bus.</i>	<i>Bus.</i>	<i>Bus.</i>	<i>Bus.</i>	<i>Bus.</i>	<i>Bus.</i>	<i>Cts.</i>	<i>Cts.</i>	<i>Cts.</i>	<i>Cts.</i>	<i>Cts.</i>	<i>Cts.</i>	<i>Cts.</i>
Maine.....	22.5	23.0	23.0	22.0	20.5	18.0	17.5	91	83	90	90	90	80	60
Vermont.....	22.0	23.0	26.0	24.0	18.8	19.0	18.0	97	85	96	105	110	55	75
New York.....	15.0	17.5	18.5	15.5	15.0	15.5	18.0	90	89	84	90	100	80	41
New Jersey.....	19.4	18.0	21.0	20.0	18.0	18.0	21.0	96	100	84	92	105	94	46
Pennsylvania.....	18.8	17.0	20.5	17.0	15.0	10.5	21.5	91	89	85	99	100	89	40
North Atlantic.....	13.5	17.5	19.7	16.5	15.2	13.3	19.7	90.4	88.8	84.8	88.6	99.6	83.3	41.1
Ohio.....	19.0	17.0	19.0	18.5	15.0	14.0	20.0	89	95	86	87	92	89	41
Indiana.....	13.4	13.0	13.5	12.5	13.2	13.0	18.0	89	95	85	85	95	89	39
Illinois.....	15.0	13.0	16.2	14.0	15.0	12.0	12.5	93	92	85	90	98	85	45
Michigan.....	13.0	13.0	11.5	13.5	9.4	7.5	10.0	83	80	80	79	85	83	44
Wisconsin.....	12.8	12.5	13.5	12.5	12.0	11.0	10.0	85	87	82	83	93	82	50
Minnesota.....	11.7	13.0	11.0	10.5	10.0	9.0	8.5	76	75	70	78	84	65	38
Iowa.....	14.8	13.0	13.0	10.0	13.4	13.0	9.5	88	82	85	90	95	89	60
Missouri.....	11.6	12.5	14.5	9.0	9.5	11.0	10.0	92	85	90	95	100	90	40
North Dakota.....	11.9	15.0	14.5	14.5	7.4	4.0	6.0	69	80	64	68	73	65	37
South Dakota.....	11.7	12.5	14.5	12.0	9.0	7.0	5.0	71	80	64	67	74	70	28
Nebraska.....	11.2	11.0	12.0	10.0	9.0	7.0	8.5	89	70	85	85	85	75	66
North Central.....	13.5	13.5	12.8	12.6	11.1	9.7	12.0	81.2	82.5	75.2	78.1	87.4	78.5	41.0
Delaware.....	11.5	10.0	12.5	11.5	13.0	7.5	13.0	94	90	95	95	100	95	45
Maryland.....	19.8	19.0	22.0	19.0	18.4	14.0	22.0	98	100	93	95	100	95	47
Virginia.....	13.5	15.5	14.5	13.5	13.8	9.0	15.1	98	95	93	95	99	98	55
West Virginia.....	18.4	18.5	20.5	18.0	17.8	12.5	20.5	101	100	97	97	110	106	56
North Carolina.....	13.0	15.5	14.0	13.5	13.5	12.0	13.0	103	100	100	100	107	98	58
South Atlantic.....	16.4	17.2	18.2	16.1	16.1	11.6	18.5	99.8	98.6	95.7	96.1	105.5	101.1	54.1
Kentucky.....	10.2	10.5	9.5	10.0	10.5	7.0	12.5	92	84	86	86	102	90	50
Tennessee.....	14.1	16.0	13.5	14.0	13.7	12.5	13.5	103	100	90	100	110	100	65
South Central.....	11.4	12.3	11.0	11.6	12.0	9.8	13.0	96.1	90.5	87.3	93.1	106.2	97.4	57.7
United States.....	16.8	16.2	16.8	15.0	13.9	12.2	17.7	88.6	88.1	82.9	86.7	96.9	83.5	42.4

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

TABLE 116.—*Buckwheat: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32*

Crop year	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Weighted average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1922-23.....	85.2	82.2	84.4	89.0	88.5	88.6	92.0	95.0	98.4	102.3	101.4	99.4	89.9
1923-24.....	96.6	94.2	93.4	94.7	92.7	92.5	94.7	93.6	97.0	96.5	104.5	123.9	96.3
1924-25.....	118.8	107.1	106.8	104.6	107.0	112.2	112.4	104.1	113.3	112.3	115.7	110.0	108.6
1925-26.....	101.2	87.6	86.7	87.9	85.7	80.9	81.7	82.5	85.0	90.1	89.9	93.7	87.5
1926-27.....	90.4	86.5	83.6	83.5	83.6	84.6	86.0	85.1	88.1	98.8	101.0	98.1	87.0
1927-28.....	92.3	82.9	79.4	81.0	82.0	85.2	90.2	94.8	102.3	108.0	108.0	98.1	87.6
1928-29.....	92.6	84.5	84.8	83.7	91.2	94.3	94.1	96.4	96.5	94.7	100.4	99.6	90.7
1929-30.....	96.6	95.8	93.6	95.9	97.3	95.8	94.9	94.8	95.7	100.0	98.3	97.4	96.3
1930-31.....	97.1	90.7	82.8	80.0	79.1	76.6	77.4	75.2	73.2	72.6	70.0	59.2	79.6
1931-32.....	52.4	40.2	41.2	41.9									

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by average monthly marketings. Mean of prices reported in 1st of month and 1st of succeeding month, September, 1922-December, 1923.

TABLE 117.—*Sorghums*<sup>1</sup> for grain, forage, and all purposes: Acreage, production, value, United States, 1919-1931

Year	For grain			For forage			For all purposes			Price per bushel received by producers Dec. 1 <sup>2</sup>	Farm value, basis Dec. 1 farm price
	Acreage	Yield per acre	Production	Acreage	Yield per acre	Production	Acreage	Equivalent yield per acre	Equivalent production on total acreage		
	1,000 acres	Bus.	1,000 bus.	1,000 acres	Short tons	1,000 short tons	1,000 acres	Bus.	1,000 bus.	Cents	1,000 dollars
1919	3,630	20.4	73,950	2,665	1.67	4,438	6,295	19.4	122,350	127.4	155,889
1920	4,027	21.8	87,732	2,513	1.78	4,479	6,540	20.9	136,385	93.8	127,976
1921	3,700	19.2	70,947	2,424	1.57	3,794	6,124	18.3	112,288	39.2	44,068
1922	3,369	14.7	49,523	2,127	1.37	2,917	5,498	13.7	75,530	87.3	65,942
1923	4,201	14.7	61,643	2,150	1.40	3,015	6,354	13.9	88,466	93.5	82,544
1924	3,506	16.7	58,454	2,184	1.40	3,050	5,690	15.5	87,920	85.5	75,140
1925	3,857	14.2	55,236	2,885	1.29	3,070	6,272	13.1	82,244	75.1	61,743
1926	4,211	16.8	70,569	2,229	1.32	2,950	6,440	15.8	101,502	54.2	55,007
1927	4,270	17.0	72,736	2,452	1.47	3,613	6,722	16.0	107,276	62.7	67,261
1928	4,121	17.8	73,425	2,406	1.48	3,566	6,527	17.1	111,702	61.5	69,751
1929	3,467	14.2	49,390	2,664	1.37	3,654	6,131	13.2	81,041	70.5	57,127
1930	3,449	10.8	37,208	3,127	1.20	3,750	6,598	9.8	64,416	68.6	40,940
1931	4,503	15.5	69,558	2,650	1.33	3,533	7,152	14.6	104,529	30.0	31,879

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

<sup>1</sup> Kafir, milo, feterita, durra, etc.

<sup>2</sup> From 1910 to 1921, Nov. 15 price.

<sup>3</sup> Preliminary.

TABLE 118.—*Sorghums*:<sup>1</sup> Acreage and production, by States, average 1924-1928, annual 1928-1931

State	Acreage for all purposes					Production for all purposes <sup>2</sup>				
	Average, 1924-1928	1928	1929	1930	1931 <sup>3</sup>	Average, 1924-1928	1928	1929	1930	1931 <sup>3</sup>
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
Missouri	77	76	61	65	76	1,114	1,218	915	975	1,444
Nebraska	24	24	15	12	15	378	420	225	204	218
Kansas	1,827	1,153	959	968	1,107	20,775	20,754	14,385	10,374	17,172
Oklahoma	1,463	1,417	1,198	1,335	1,443	17,861	17,004	13,178	8,673	12,987
Texas	2,855	3,272	3,381	3,593	3,871	48,311	62,168	43,803	35,980	60,000
Colorado	231	220	175	190	191	2,235	2,530	1,838	2,340	2,101
New Mexico	240	255	293	297	356	4,463	4,590	4,571	2,435	7,332
Arizona	25	25	21	30	24	394	725	567	900	649
California	85	55	78	86	69	2,368	2,295	2,079	2,550	1,567
United States	6,330	6,527	6,131	6,586	7,152	98,129	111,702	81,011	64,416	104,529

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory report.

<sup>1</sup> Kafir, milo, feterita, durra, etc.

<sup>2</sup> Includes grain equivalent on forage acreage.

<sup>3</sup> Preliminary.

TABLE 119.—*Sorghums*:<sup>1</sup> Yield per acre, average 1919-1928 and annual 1928-1931, and estimated price per bushel December 1, average 1925-1929, and annual 1928-1931, by States

State	Equivalent yield per acre						Estimated price per bushel Dec. 1					
	Av., 1919-1928	1926	1927	1928	1929	1930	Av., 1925-1929	1928	1927	1928	1929	1930
	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
Missouri	15.6	14.0	16.0	16.0	15.0	15.0	87	80	75	80	100	80
Nebraska	16.4	10.0	20.5	17.5	15.0	17.0	14.5	84	80	80	85	100
Kansas	16.0	12.5	17.5	18.0	15.0	10.5	16.0	64	60	60	61	70
Oklahoma	13.1	12.5	12.5	12.0	11.0	6.5	9.0	59	45	50	62	65
Texas	18.0	19.0	17.0	19.0	18.0	10.0	15.5	65	55	65	60	70
Colorado	12.2	5.0	11.0	11.5	10.5	13.0	11.0	67	60	65	60	50
New Mexico	19.7	21.0	14.0	18.0	15.6	8.2	22.0	62	40	60	65	45
Arizona	24.1	22.0	22.0	29.0	27.0	30.0	27.0	75	60	75	80	95
California	27.5	27.0	28.0	27.0	26.4	30.0	23.0	96	84	97	90	70
United States	16.4	15.8	16.0	17.1	13.2	9.8	14.6	64.8	54.2	62.7	61.5	70.5

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

<sup>1</sup> Kafir, milo, feterita, durra, etc.

# STATISTICS OF GRAINS

657

TABLE 120.—*Grain sorghums:*<sup>1</sup> *Receipts at Kansas City, by months, 1922-23 to 1931-32*

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Total
	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.
1922-23	168	444	420	233	169	139	76	50	69	35	19	18	1,840
1923-24	195	350	465	579	398	340	274	262	250	106	63	103	3,395
1924-25	647	1,132	683	636	497	320	301	440	221	193	68	24	5,172
1925-26	279	629	416	290	261	211	260	469	162	94	136	97	3,334
1926-27	367	493	626	442	293	216	192	211	249	285	79	112	3,625
1927-28	410	905	696	519	592	392	323	343	224	87	51	236	4,773
1928-29	449	675	856	525	705	426	394	665	207	196	97	182	5,390
1929-30	294	626	296	447	327	296	202	179	83	42	52	34	2,863
1930-31	299	239	162	145	130	139	109	204	41	38	31	134	1,671
1931-32	257	76											

Bureau of Agricultural Economics. Compiled from annual statistical reports of Kansas City Board of Trade.

<sup>1</sup> Includes kafir corn, millo maize, and feterita. Quoted as Kafir in Table 117, 1927 Yearbook. Receipts for 1909-10 to 1921-22 available in 1931 Yearbook, p. 670, Table 131.

TABLE 121.—*Grain sorghums: Classification of receipts graded by licensed inspectors, all inspection points, total of all classes under each grade, 1925-26 to 1930-31*

	Grade					
	No. 1	No. 2	No. 3	No. 4	Sample	Total
Year beginning July—	Cars	Cars	Cars	Cars	Cars	Cars
1925-26	312	4,158	5,796	1,639	495	12,400
1926-27	878	7,150	6,674	1,792	691	17,215
1927-28	1,175	9,885	8,125	3,143	965	23,293
1928-29	893	7,247	5,400	6,794	3,969	21,278
1929-30	557	5,493	4,043	3,664	1,722	15,481
1930-31	224	2,368	2,432	1,240	390	6,654

Bureau of Agricultural Economics.

TABLE 122.—*Kafir, No. 2 White: Weighted average price<sup>1</sup> per bushel of reported cash sales, Kansas City, 1921-22 to 1931-32*

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Average
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1921-22	48	50	50	72	74	67	73	77	93	96	111	102	76
1922-23	100	91	89	90	93	96	99	94	84	83	(?)	(?)	—
1923-24	(?)	71	(?)	68	67	73	62	85	94	(?)	113	89	—
1924-25	88	98	109	108	93	92	97	103	113	116	107	100	101
1925-26	82	77	77	72	68	70	69	70	79	76	74	71	71
1926-27	64	64	63	63	65	69	79	102	110	97	(?)	70	—
1927-28	69	71	74	81	88	90	92	91	92	83	60	83	82
1928-29	78	74	75	80	71	71	71	74	89	90	105	81	77
1929-30	77	73	76	72	77	91	91	94	92	101	98	(?)	—
1930-31	63	61	58	53		50	58	57	51	42	42	36	55
1931-32	40	33											

Bureau of Agricultural Economics. Compiled from Kansas City Grain Market Review, formerly Daily Price Current. Quoted per 100 pounds; converted to bushels of 56 pounds. Data for 1909-1920 available in 1930 Yearbook, Table 123.

<sup>1</sup> Average of daily prices weighted by car-lot sales.

<sup>2</sup> No quotations.

# STATISTICS OF COTTON, SUGAR, AND TOBACCO

TABLE 123.—Cotton: Acreage, production, value, exports, etc., United States, 1849, 1859, 1866–1931

Year	Acreage harvested	Average yield per acre	Production <sup>1</sup>	Price per pound received by producers, Dec. 1	Farm value, basis Dec. 1 farm price	Average price per pound, New York <sup>2</sup>	Domestic exports, year beginning Aug. 1 <sup>3</sup>	Imports, year beginning Aug. 1 <sup>4</sup>	Net exports, year beginning Aug. 1 <sup>4</sup>
	1,000 acres	Lbs.	1,000 bales	Cents	1,000 dollars	Cents	1,000 bales	1,000 bales	1,000 bales
1849			5,469			12.34	1,271	1	1,270
1859			5,357			11.00	3,535	1	3,531
1866	7,599	129.0	1,750			31.59	1,323	2	1,324
1867	7,828	189.8	2,340			24.85	1,511	2	1,510
1868	6,799	192.2	2,380			29.01	1,288	6	1,281
1869			5,012			23.98			
1869	7,743	196.9	5,012			23.98	1,980	4	1,977
1870	8,585	198.9	3,800			16.95	2,894	3	2,893
1871	7,558	148.2	2,553			20.48	1,851	7	1,844
1872	8,483	188.7	3,920			18.15	2,437	11	2,426
1873	9,510	179.7	3,683			17.00	2,706	5	2,702
1874	11,784	147.5	3,941			15.00	2,523	5	2,520
1875	11,934	190.6	5,123			13.00	3,003	5	2,999
1876	11,677	167.8	4,438	9.0	174,724	11.73	2,869	6	2,864
1877	12,133	163.8	4,370			11.28	3,198	7	3,194
1878	12,344	191.2	5,244	8.2	192,515	10.83	3,265	6	3,259
1879	14,480	181.0	6,755	10.3	269,305	12.02	3,711	7	3,705
1880	15,951	184.5	6,343	9.8	289,063	11.34	4,409	9	4,403
1881	16,711	149.8	5,456			12.16	3,430	9	3,426
1882	16,277	185.7	6,987	9.1	275,513	10.68	4,582	9	4,577
1883	16,778	184.8	5,701	9.1	250,977	10.64	3,745	15	3,734
1884	17,440	153.8	5,682	9.2	246,575	10.54	3,740	10	3,733
1885	18,301	164.4	6,575	8.4	251,775	9.44	4,198	11	4,185
1886	18,455	169.5	6,446	8.1	251,856	10.25	4,274	9	4,266
1887	18,641	182.7	7,020	8.5	290,901	10.27	4,557	11	4,547
1888	19,059	180.4	6,941	8.5	292,139	10.71	4,720	17	4,704
1889	20,175	169.7	7,473	8.5	275,249	11.27	4,934	19	4,915
1890	19,512	187.0	8,674	8.6	313,360	9.48	5,859	45	5,815
1891	19,069	179.4	9,018	7.2	247,633	7.68	5,888	61	5,827
1892	15,911	209.2	6,664	8.3	277,194	8.45	4,456	90	4,367
1893	19,525	149.9	7,493	7.0	204,983	7.75	5,309	58	5,253
1894	23,688	196.3	9,476	4.6	212,335	6.38	7,010	104	6,908
1895	20,185	155.6	7,161	7.6	238,503	8.10	4,710	115	4,598
1896	23,273	184.9	8,533	6.7	286,169	7.71	6,172	119	6,055
1897	24,320	182.7	10,898	6.7	296,816	6.40	7,757	102	7,656
1898	24,967	220.6	11,189	5.7	315,449	6.00	7,662	105	7,567
1899	24,275		8,345						
1899	24,327	183.8	8,345	7.0	326,215	8.36	6,228	140	6,081
1900	24,933	194.4	10,148	9.2	463,310	9.38	6,800	109	6,692
1901	26,774	170.0	8,510	7.0	334,088	8.73	6,949	202	6,730
1902	27,175	187.3	10,631	7.6	403,718	9.96	7,084	151	6,936
1903	27,052	174.3	9,571	10.5	516,763	12.84	6,207	103	6,107
1904	31,215	205.9	15,458	9.0	603,435	9.09	8,908	129	8,781
1905	31,110	186.6	10,375	10.8	569,791	11.30	7,118	144	6,980
1906	31,374	202.5	15,107	9.6	685,534	11.24	8,943	227	8,714
1907	30,660	179.1	11,107	10.4	575,226	11.53	7,666	153	7,518
1908	32,444	194.9	15,212	8.7	575,092	10.23	8,955	181	8,778
1909	32,044		10,005						

Bureau of Agricultural Economics: italic figures are census returns; other acreage, yield, and production figures are estimates by the crop-reporting board; acreage revised on census basis.

<sup>1</sup> 500-pound gross weight bales, from 1899–1931.

<sup>2</sup> Compiled, 1849–1888, from Cotton Movement and Fluctuations, an annual, published by Latham, Alexander & Co., New York, and are averages for crop year beginning September. From New York Commercial and Financial Chronicle, 1889–1899, and from reports of New York Cotton Exchange since 1900. Since 1889 the averages are for crop year beginning August.

<sup>3</sup> Excluding linters from 1914 to 1920.

<sup>4</sup> Compiled from Commerce and Navigation of the United States, 1849–1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June and July, 1919–1931, and January, 1927–1931.

<sup>5</sup> Bales of 500 pounds gross weight.

<sup>6</sup> Bales of 478 pounds net, which are equivalent to bales of 500 pounds gross weight.

<sup>7</sup> Total exports (domestic plus foreign) minus imports.

<sup>8</sup> Year beginning July 1.

<sup>9</sup> Estimated from value of imports. Average import price per pound calculated by assuming that the percentage change in import price from the previous year is equal to the percentage change in the export price.

TABLE 123.—*Cotton: Acreage, production, value, exports, etc., United States, 1849, 1859, 1866-1931—Continued*

Year	Acreage harvested	Average yield per acre	Production	Price per pound received by producers, Dec. 1	Farm value, basis Dec. 1 farm price	Average price per pound, New York	Domestic exports, year beginning Aug.	Imports, year beginning Aug.	Net exports, year beginning Aug.
	1,000 acres	Lbs.	1,000 bales	Cents	1,000 dollars	Cents	1,000 bales	1,000 bales	1,000 bales
1909	30,938	154.3	10,005	13.9	697,681	14.66	6,353	170	6,194
1910	32,403	170.7	11,609	14.1	820,407	14.87	8,027	245	7,787
1911	36,045	207.7	15,693	8.8	687,888	10.85	11,116	223	10,895
1912	34,283	190.9	15,703	11.9	817,055	12.29	9,146	249	8,899
1913	37,089	182.0	14,156	12.2	862,708	13.21	9,508	273	9,231
1914	36,832	209.2	16,135	6.8	549,086	10.8.89	8,702	400	8,322
1915	31,412	170.3	11,192	11.3	631,460	11.98	6,113	458	5,673
1916	34,985	156.6	11,450	19.6	1,122,295	19.28	5,525	311	5,219
1917	33,841	159.7	11,802	27.7	1,566,198	29.68	4,402	231	4,175
1918	36,008	159.6	18,041	27.6	1,663,633	31.01	5,774	211	5,568
1919	33,740		11,421						
1919	33,566	161.5	11,421	35.6	2,034,558	38.29	6,707	732	5,968
1920	35,878	178.4	15,440	13.9	933,658	17.89	5,973	287	5,753
1921	30,509	124.5	7,654	16.2	643,933	18.92	6,348	380	5,980
1922	33,036	141.2	11,755	23.8	1,160,968	26.24	5,007	492	4,536
1923	37,123	130.6	10,140	31.0	1,571,829	31.11	5,815	306	5,530
1924	39,204		15,628						
1924	41,360	157.4	15,628	22.6	1,540,884	24.74	8,240	328	7,923
1925	46,053	167.2	16,104	18.2	1,464,032	20.53	8,267	340	7,939
1926	47,087	182.6	17,977	10.9	932,736	15.15	11,299	419	10,900
1927	40,138	154.5	12,055	19.6	1,269,885	20.42	7,859	354	7,524
1928	45,341	152.9	14,478	18.0	1,301,796	19.73	8,419	479	7,957
1929	45,793	155.0	14,528	16.4	1,217,829	16.60	7,035	395	6,650
1930	45,091	147.7	15,832	9.5	659,455	10.38	7,133	112	7,029
1931 <sup>12</sup>	40,495	200.1	16,918	5.7	485,611				

<sup>10</sup> Average for nine months only. Exchange closed August-Nov. 17, on account of war.<sup>11</sup> Cotton grown in the United States. Excludes about 7,000 bales Lower California cotton ginned in the United States. Small quantities such cotton included in census ginning reports and prior years.<sup>12</sup> Preliminary.TABLE 124.—*Cotton: Acreage in cultivation and acreage abandoned, by States, averages, and annual, 1926-1931*

State	Acreage in cultivation July 1							Acreage abandoned after July 1						
	Average, 1926-1929	1926 <sup>1</sup>	1927 <sup>1</sup>	1928	1929	1930	1931 <sup>2</sup>	Average, 1926-1929	1926 <sup>3</sup>	1927 <sup>3</sup>	1928	1929	1930	1931
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	P. d.	P. d.	P. d.	P. d.	P. d.	P. d.	P. d.
Missouri	404	472	305	355	348	377	352	4.8	8.0	4.5	6.0	2.0	2.0	0.5
Virginia	86	95	65	81	89	91	72	2.0	2.0	2.0	2.0	1.3	2.0	1.0
North Carolina	1,922	2,015	1,749	1,892	1,916	1,656	1,358	1.6	1.5	1.2	1.7	2.0	0.8	0.7
South Carolina	2,527	2,718	2,454	2,485	2,273	2,191	1,950	2.7	2.5	4.0	5.0	2.5	0.8	0.5
Georgia	3,778	4,025	3,501	3,883	3,818	3,906	3,471	3.6	1.5	2.5	4.0	1.7	1.1	0.9
Florida	95	108	67	101	96	122	118	5.2	3.0	4.0	6.0	1.8	2.0	3.0
Tennessee	1,129	1,178	965	1,145	1,147	1,250	1,109	2.2	3.0	2.0	3.3	1.0	2.0	0.4
Alabama	3,564	3,699	3,214	3,643	3,727	3,789	3,444	1.7	1.3	1.5	3.0	1.0	0.5	0.7
Mississippi	3,820	3,809	3,408	4,154	4,229	4,290	4,036	2.6	1.5	2.0	3.0	1.5	1.1	1.2
Arkansas	3,718	3,867	3,142	3,834	3,933	3,996	3,598	2.3	2.0	3.0	4.0	1.9	2.2	1.0
Louisiana	1,939	2,019	1,585	2,052	2,135	2,142	1,934	2.8	2.0	2.7	3.0	1.0	1.5	0.7
Oklahoma	4,688	5,083	4,187	4,420	4,430	4,099	3,352	6.7	8.0	14.0	4.0	3.5	2.5	1.0
Texas	18,338	19,140	16,850	18,330	18,229	17,528	15,656	3.8	4.0	4.0	3.2	4.0	3.3	1.5
New Mexico	124	125	100	123	132	134	116	10.6	6.0	5.0	5.0	1.5	5.0	1.5
Arizona	180	168	140	202	227	215	173	1.6	0.6	0.7	1.0	0.5	0	1.0
California	202	167	130	223	319	197	17	3.0	1.5	2.2	2.1	1.0	0.8	
All other	34	44	23	23	19	19	13	4.6	2.3	5.0	5.0	0	0.5	0.8
United States	46,548	48,730	41,905	46,946	47,067	46,078	40,954	3.5	3.4	4.2	3.4	2.7	2.1	1.1

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> In cultivation June 25.<sup>2</sup> Preliminary.<sup>3</sup> Abandoned after June 25.<sup>4</sup> 8-year average.

TABLE 125.—Cotton: Acreage harvested, by States, 1919-1931

State	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931 <sup>1</sup>
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres
Missouri.....	125	136	103	196	355	403	530	434	201	334	341	360	350
Virginia.....	42	42	34	55	74	102	100	93	64	79	88	89	71
North Carolina.....	1,490	1,587	1,403	1,628	1,679	2,005	2,017	1,985	1,728	1,860	1,878	1,643	1,348
South Carolina.....	2,835	2,961	2,571	1,912	1,965	2,404	2,181	2,648	2,856	2,361	2,216	2,173	1,910
Georgia.....	5,220	4,900	4,172	3,418	3,421	3,046	3,589	3,965	3,413	3,728	3,753	3,863	3,440
Florida.....	103	100	65	118	147	80	101	105	64	95	94	120	114
Tennessee.....	758	840	634	985	1,172	998	1,173	1,143	965	1,107	1,136	1,225	1,105
Alabama.....	2,791	2,855	2,235	2,771	3,079	3,055	3,504	3,651	3,166	3,534	3,690	3,770	3,420
Mississippi.....	2,848	2,950	2,628	3,014	3,170	2,981	3,466	3,752	3,340	4,029	4,166	4,243	3,988
Arkansas.....	2,725	2,980	2,352	2,790	3,026	3,094	3,738	3,790	3,048	3,681	3,858	3,908	3,662
Louisiana.....	1,527	1,470	1,168	1,140	1,405	1,616	1,874	1,979	1,542	1,990	2,114	2,110	1,920
Oklahoma.....	2,424	2,749	2,206	2,615	3,197	3,561	5,214	4,670	3,601	4,243	4,275	3,997	3,318
Texas.....	10,476	11,898	10,745	11,874	14,150	17,175	17,066	18,374	16,176	17,743	17,500	16,960	15,421
New Mexico.....				28	60	101	107	130	95	117	130	127	114
Arizona.....	107	230	90	101	127	180	162	167	139	200	226	215	170
California.....	85	150	63	67	83	130	109	162	128	218	309	270	195
All other.....	10	24	18	16	13	41	57	43	22	22	19	19	13
United States.....	33,566	35,878	30,504	33,036	37,123	41,360	46,053	47,087	40,138	45,341	45,793	45,091	40,495
Lower California (old Mexico).....	100	125	83	135	150	137	150	130	110	160	147	100	69

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.

TABLE 126.—Cotton: Production of lint in 500-pound gross-weight bales, by States, and linters, United States, 1919-1931

State	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931 <sup>1</sup>
	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales
Missouri.....	64	79	70	149	127	198	299	218	115	147	220	151	270
Virginia.....	23	21	16	27	51	39	53	51	31	44	48	42	43
North Carolina.....	830	925	776	852	1,020	1,102	1,213	861	836	747	775	775	775
South Carolina.....	1,426	1,623	755	493	770	807	889	1,008	730	726	830	1,001	1,015
Georgia.....	1,660	1,415	787	715	588	1,002	1,164	1,496	1,100	1,030	1,343	1,593	1,393
Florida.....	16	18	11	25	12	22	38	32	17	19	20	50	43
Tennessee.....	310	325	302	391	226	354	515	451	359	426	515	377	605
Alabama.....	713	663	560	824	587	985	1,357	1,498	1,191	1,103	1,342	1,473	1,430
Mississippi.....	961	895	813	989	604	1,099	1,991	1,888	1,355	1,475	1,915	1,464	1,725
Arkansas.....	884	1,214	797	1,011	622	1,094	1,600	1,548	1,000	1,216	1,435	874	1,855
Louisiana.....	298	368	279	313	368	493	910	820	518	691	800	715	665
Oklahoma.....	1,016	1,336	481	627	656	1,511	1,691	1,773	1,037	1,205	1,143	854	1,220
Texas.....	3,099	4,345	2,196	3,222	4,340	4,949	4,163	5,628	4,352	5,106	3,940	4,038	5,270
New Mexico.....		10	6	12	20	27	26	75	70	88	90	109	08
Arizona.....	60	103	45	47	78	108	119	122	91	149	153	155	119
California.....	56	75	34	21	54	77	122	131	91	172	260	204	181
All other.....	3	3	3	7	8	14	20	17	7	7	9	7	9
United States.....	11,421	13,440	7,954	9,755	10,110	13,626	16,104	17,977	12,955	14,478	14,828	13,932	16,918
Linters, total U. S. <sup>2</sup> .....	608	440	395	608	669	897	1,115	1,158	1,016	1,282	1,241	986	-----

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census.

<sup>1</sup> Preliminary estimate of the Department of Agriculture.<sup>2</sup> Slight differences from census figures on ginnings are due to ginnings in one State of cotton grown in another.<sup>3</sup> Year beginning Aug. 1.

TABLE 127.—Cotton: Yield per acre and estimated price per pound, December 1, by States, averages, and annual, 1920-1931<sup>1</sup>

State	Yield per acre							Estimated price per pound						
	Avg. 1920- 1929	1926	1927	1928	1929	1930	1931	Avg. 1925- 1929	1926	1927	1928	1929	1930	1931
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
Missouri.....	254	240	183	210	308	185	309	15.4	10.0	20.6	18.0	16.7	9.5	6.0
Virginia.....	240	204	230	265	258	225	299	17.1	11.4	20.0	18.2	17.0	9.6	5.8
North Carolina.....	247	202	238	215	190	225	279	17.0	11.5	19.5	18.5	16.7	9.9	6.0
South Carolina.....	160	132	143	147	179	220	250	17.0	11.7	19.0	18.4	16.4	9.9	6.0
Georgia.....	136	150	154	132	171	197	194	16.7	11.1	19.4	18.2	15.8	9.3	5.7
Florida.....	184	188	178	185	217	147	262	16.5	10.2	19.1	17.9	16.7	8.5	5.5
Tennessee.....	151	196	180	150	174	187	200	16.6	10.7	19.0	18.0	16.5	9.1	5.5
Alabama.....	182	241	194	175	220	165	307	17.5	11.6	20.5	18.5	17.2	10.0	6.0
Mississippi.....	169	195	157	162	178	107	249	16.4	11.0	20.2	18.2	16.7	9.2	6.0
Arkansas.....	100	200	170	168	183	162	216	16.6	11.0	19.2	17.9	16.6	9.3	5.8
Louisiana.....	140	181	138	136	128	102	178	15.9	9.7	19.5	17.2	15.7	8.8	5.1
Oklahoma.....	132	147	129	138	108	114	164	16.4	10.8	19.3	17.5	16.0	9.4	5.5
Texas.....	293	299	352	360	333	375	412	17.9	12.3	19.8	19.5	17.7	10.2	5.8
New Mexico.....	296	349	315	357	324	346	324	21.3	13.3	25.6	22.5	22.5	11.8	7.9
Arizona.....	306	387	340	378	402	468	444	18.9	14.0	21.0	19.5	18.0	10.7	6.5
California.....														
United States.....	154.4	182.6	154.5	152.9	155.0	147.7	200.1	16.6	10.9	19.6	18.0	16.4	9.6	5.7

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> 8-year average.

TABLE 128.—Cotton: World production of lint, 1909-10 to 1931-32

Crop year	Estimated world total excluding China	Estimated world total including China	Production in selected countries						Estimated world total commercial crop <sup>1</sup>
			United States	India	Egypt	China <sup>2</sup>	Brazil	Russia	
	1,000 bales <sup>3</sup>	1,000 bales <sup>3</sup>	1,000 bales <sup>3</sup>	1,000 bales <sup>3</sup>	1,000 bales <sup>3</sup>	1,000 bales <sup>3</sup>	1,000 bales <sup>3</sup>	1,000 bales <sup>3</sup>	1,000 bales <sup>4</sup>
1909-10.....	18,900	—	10,005	3,998	1,036	—	324	—	10,241
1910-11.....	18,400	—	11,609	3,254	1,555	—	357	—	13,027
1911-12.....	21,900	—	15,693	2,730	1,830	—	380	—	21,269
1912-13.....	21,100	—	13,703	3,702	1,554	—	418	—	20,976
1913-14.....	22,200	—	14,155	4,239	1,588	—	477	—	21,613
1914-15.....	24,200	—	16,135	4,359	1,337	—	465	1,270	23,763
1915-16.....	17,800	—	11,192	3,128	989	—	339	1,512	17,649
1916-17.....	18,396	19,800	11,450	3,759	1,048	1,534	337	1,199	18,042
1917-18.....	17,608	19,700	11,302	3,393	1,304	2,092	414	634	18,140
1918-19.....	17,841	20,900	12,041	3,328	999	3,039	406	161	19,755
1919-20.....	18,782	21,800	11,421	4,853	1,155	2,518	461	81	20,220
1920-21.....	19,217	21,100	13,440	3,013	1,251	1,893	476	58	19,565
1921-22.....	13,886	15,400	7,954	3,753	902	1,514	476	43	15,334
1922-23.....	16,982	19,300	9,755	4,247	1,391	2,318	504	55	17,926
1923-24.....	17,707	19,700	10,140	4,320	1,533	1,993	573	198	19,036
1924-25.....	22,622	24,300	13,628	5,095	1,507	2,178	805	453	23,836
1925-26.....	25,798	27,600	16,104	5,201	1,629	2,192	802	782	26,976
1926-27.....	26,658	28,400	17,977	4,205	1,538	1,742	512	830	27,319
1927-28.....	22,125	24,000	12,955	4,090	1,261	1,875	487	1,090	23,126
1928-29.....	24,434	26,900	14,478	4,833	1,672	2,466	525	1,250	26,623
1929-30.....	21,384	26,500	14,828	4,289	1,768	2,116	584	1,310	24,538
1930-31.....	24,250	25,600	13,932	4,033	1,715	2,250	455	1,550	25,304
1931-32 <sup>5</sup> .....	25,500	27,300	16,918	7,349	1,288	1,800	550	1,900	—

Bureau of Agricultural Economics. Compiled from official sources and International Institute of Agriculture unless otherwise stated. The crop year is from Aug. 1 to July 31. For the United States prior to 1914 the figures apply to the year beginning Sept. 1.

<sup>1</sup> Chinese Cotton Mill Owners' Association, except for 1930-31 and 1931-32, which are estimates of this bureau. Figures represent the crop in the most important cotton-producing Provinces where the commercial crop is grown. Most of the cotton produced in other Provinces is used for home hand-loom consumption.

<sup>2</sup> Figures as reported by the U. S. Bureau of the Census, including the cotton destined to enter commercial channels for factory purposes. Estimates of the commercial crop in China are included.

<sup>3</sup> Bales of 478 pounds net.

<sup>4</sup> American in running bales and foreign cotton in bales of 478 pounds net.

<sup>5</sup> Bales of 500 pounds net.

<sup>6</sup> Preliminary.

<sup>7</sup> Second forecast of production which includes total crop except late plantings.

TABLE 129.—Cotton: Acreage and yield of lint per acre in specified countries; average, 1909-10 to 1913-14, 1924-25 to 1928-29; annual, 1928-29 to 1931-32

Country	Acreage						Yield of lint per acre					
	Average, 1909- 10 to 1913- 14	Average, 1924- 25 to 1928- 29	1928- 29	1929- 30	1930- 31	1931- 32 <sup>1</sup>	Average, 1909- 1924- 10 to 1913- 14	Average, 1924- 25 to 1928- 29	1928- 29	1929- 30	1930- 31	1931- 32 <sup>1</sup>
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
United States.....	34,152	43,998	45,341	45,793	45,091	40,495	182	163	153	155	148	200
India.....	22,503	26,368	27,033	27,922	23,610	23,511	76	88	86	79	82	68
Egypt.....	1,743	1,817	1,505	1,011	2,182	1,747	399	404	443	443	379	352
China.....	4,360	4,647	5,133	5,225	5,078		227	243	197	206	169	
Brazil.....	887	1,290	1,273	1,436	1,614		209	202	197	195	185	
Russia.....	1,569	1,695	2,258	2,550	3,870	5,281	276	245	261	246	191	172
Mexico.....	253	443	502	492	390	326	353	262	265	239	217	309
Chosen (Korea).....	146	487	503	456	473	461	67	132	142	146	156	141
Uganda.....	58	504	699	663	740	876	169	115	117	71	101	109
Peru.....	4163	301	283	314			360	379	461			
Anglo Egyptian Sudan.....	44	242	315	366	387	356	158	210	216	180	131	
Argentina.....	5	235	256	301	424		214	208	247	228		
Total above countries, including China, reporting 1928-29 to 1930-31.....			84,482	85,026	83,995							
Estimated world total, including China.....			87,400	87,700	86,700	81,000						

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture. Data for crop year as given at the head of the table are for crops harvested between Aug. 1 and July 31. This applies to both Northern and Southern Hemispheres. For the United States prior to 1914 the figures apply to the harvest year beginning Sept. 1.

<sup>1</sup> Preliminary.

<sup>2</sup> Fourth forecast, which includes total area except late plantings.

<sup>3</sup> Average for 3 years.

<sup>4</sup> Average, 1914-15 to 1918-19.

TABLE 130.—Cotton: Estimated monthly marketings by farmers, 1921-22 to 1930-31

Crop year	Percentage of year's sales <sup>1</sup>											
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1921-22.....	3.6	14.0	22.3	17.1	12.1	5.9	4.3	4.6	4.6	5.9	3.0	2.6
1922-23.....	5.2	16.8	25.3	19.8	12.8	5.9	4.4	3.7	2.0	1.0	1.5	1.0
1923-24.....	4.1	16.3	24.6	24.9	13.3	5.8	3.1	2.4	1.7	1.3	.9	1.6
1924-25.....	3.3	15.2	25.2	22.3	14.5	7.0	5.3	3.4	1.6	1.0	.6	1.0
1925-26.....	6.5	19.3	23.1	17.6	12.0	6.5	4.2	3.1	2.3	1.7	2.1	1.6
1926-27.....	2.7	15.2	22.0	19.5	12.5	6.3	5.8	5.0	3.8	3.1	2.5	1.6
1927-28.....	6.6	20.0	23.8	17.3	9.7	4.2	4.0	4.2	3.1	2.7	2.3	2.1
1928-29.....	4.6	15.6	24.8	20.8	12.8	5.4	4.0	4.8	1.8	1.6	1.9	1.9
1929-30.....	5.7	18.2	28.3	20.6	11.8	4.2	2.6	2.3	1.4	1.1	1.6	2.2
1930-31.....	7.7	19.0	25.6	20.3	11.7	3.9	2.8	2.4	1.8	1.6	1.8	1.4

Bureau of Agricultural Economics.

<sup>1</sup> As reported by about 7,500 cotton growers, supplemented by records of State weighers, cooperative associations, and cotton dealers.

TABLE 131.—Cotton: Production of lint in specified countries: average, 1909-10 to 1913-14, 1924-25 to 1928-29; annual, 1927-28 to 1931-32

Country	Year beginning August						
	Average, 1909-10 to 1913-14	Average, 1921-25 to 1928-29	1927-28	1928-29	1929-30	1930-31	1931-32 <sup>1</sup>
<b>NORTH AMERICA</b>							
United States <sup>2</sup> .....	Bales <sup>3</sup> 13,033,000	Bales <sup>3</sup> 15,028,000	Bales <sup>3</sup> 12,955,000	Bales <sup>3</sup> 14,478,000	Bales <sup>3</sup> 14,828,000	Bales <sup>3</sup> 13,932,000	Bales <sup>3</sup> 16,918,000
Mexico.....	186,821	242,865	179,238	278,460	246,029	177,506	207,000
Total North American countries reporting 1927- 28 to 1930-31.....			13,134,238	14,756,460	15,074,029	14,109,506	
<b>SOUTH AND CENTRAL AMERICAS, WEST INDIES</b>							
Venezuela.....		32,876	32,000	36,380			
Colombia.....		14,796	11,207	9,501	10,000	10,000	
Peru.....	106,000	226,428	245,615	224,538	302,514		
Ecuador.....	<sup>4</sup> 297	6,719	4,556	5,097	6,788	12,049	
Brazil.....	387,000	546,265	487,041	525,231	594,477	454,999	<sup>5</sup> 550,000
Paraguay.....	<sup>6</sup> 92	<sup>7</sup> 11,198		12,604	16,596	18,449	
Argentina.....	2,314	99,763	101,467	132,368	143,899		
Guatemala.....	<sup>8</sup> 75	700	12	28	46		
Haiti.....	9,300	20,922	20,419	21,920	23,635		
Dominican Republic.....	<sup>9</sup> 1,163	422	273	76			
Porto Rico.....	<sup>10</sup> 1,319	1,478	960	1,335			
Salvador.....		2,739	189	217			
British West Indies.....	6,058	4,150	4,245	4,000	4,500	5,000	
Total South and Central American countries and West Indies reporting 1927-28 to 1930-31.....			507,049	543,832	605,765	482,045	
<b>EUROPE</b>							
Italy.....	5,212	<sup>11</sup> 4,760			3,300	4,000	1,000
Yugoslavia.....	922	352	190	218	585	622	
Greece.....	<sup>12</sup> 12,614	14,807	12,571	14,875	15,264	10,397	
Bulgaria.....	842	2,459	3,457	3,214	4,180	4,477	5,000
Malta.....	433	460	287	453	317	245	
Spain.....		2,270	2,553	3,189	3,000	7,431	
Total European countries reporting 1927-28 to 1930-31.....			19,058	21,949	23,246	23,172	
<b>AFRICA</b>							
Algeria.....	<sup>13</sup> 1,370	5,120	3,401	6,288	7,668	5,181	1,000
Morocco (French).....		401	369	351	369		
French West Africa:							
Dahomey.....	<sup>14</sup> 664	4,397	3,445	3,330	5,705	5,848	
Ivory Coast.....	<sup>15</sup> 212	6,441	7,127	8,309	8,092	9,436	
French Guinea.....	<sup>16</sup> 167	1,821	2,306	1,845			
Senegal.....		2,528	2,306	4,243	565	565	
French Sudan.....		7,539	9,409	9,501	9,501	12,637	
Upper Volta.....		6,795	3,599	3,816	5,876	4,441	
French Togo.....	<sup>17</sup> 463	7,448	7,084	9,432	8,805		
Nigeria.....	8,702	28,044	17,515	26,883	36,757	15,063	
French Equatorial Africa.....		<sup>18</sup> 977	692	830	3,228	6,918	4,600
EGYPT.....	1,453,000	1,535,000	1,261,000	1,672,000	1,768,000	1,715,000	1,286,000

<sup>1</sup> Preliminary.<sup>2</sup> Bales of 478 pounds net.<sup>3</sup> Linters not included. Production of linters during this period has been: Average 1909-10 to 1913-14, 502,711 bales; 1924-25 to 1928-29, 1,093,710 bales; 1927-28, 1,016,375 bales; 1928-29, 1,282,061 bales; 1929-30, 1,241,355 bales; 1930-31, 986,430 bales.<sup>4</sup> Exports.<sup>5</sup> Based on an official estimate for Northern Brazil (10 States), which during the last 10 years have produced over 80 per cent of the total Brazilian crop.<sup>6</sup> For season 1915-16.<sup>7</sup> Average for 4 years.<sup>8</sup> Average for 2 years.<sup>9</sup> Average for 3 years.<sup>10</sup> For 1 year only.<sup>11</sup> For season 1911-12.<sup>12</sup> Old boundaries.

TABLE 131.—*Cotton: Production of lint in specified countries; average, 1909-10 to 1913-14, 1924-25 to 1928-29; annual, 1927-28 to 1931-32—Continued*

Country	Year beginning August						
	Average, 1909-10 to 1913-14	Average, 1924-25 to 1928-29	1927-28	1928-29	1929-30	1930-31	1931-32
<b>AFRICA—continued</b>							
	<i>Bales</i>	<i>Bales</i>	<i>Bales</i>	<i>Bales</i>	<i>Bales</i>	<i>Bales</i>	<i>Bales</i>
Anglo-Egyptian Sudan.....	14,455	106,409	111,822	142,191	139,200	108,470	—
Italian Somaliland.....	<sup>4</sup> 510	3,694	3,828	7,034	7,500	3,459	4,000
Entrea.....	<sup>4</sup> 948	1,065	1,384	1,061	1,163	2,000	2,000
Gold Coast.....	103	<sup>7</sup> 404	84	196	—	—	—
Belgian Congo.....	—	22,188	27,557	30,867	30,831	—	—
Kenya.....	552	1,465	<sup>4</sup> 1,039	<sup>4</sup> 1,660	1,270	670	—
Uganda.....	20,338	142,453	115,896	170,757	108,051	155,647	151,000
Tanganyika.....	<sup>4</sup> 7,971	19,032	13,360	27,576	23,251	19,360	11,679
Nyasaland.....	<sup>4</sup> 603	4,448	2,336	3,740	5,098	7,806	—
Northern Rhodesia.....	<sup>7</sup> 307	200	44	52	41	—	—
Southern Rhodesia.....	—	1,986	72	226	1,130	1,757	—
Mozambique.....	<sup>4</sup> 345	5,228	11,956	12,505	7,192	—	—
Union of South Africa.....	76	11,439	9,216	8,179	13,456	7,312	—
Total African countries reporting 1927-28 to 1930-31.....	—	—	1,567,437	2,097,624	2,145,521	2,079,550	—
<b>ASIA</b>							
Cyprus.....	1,983	2,455	1,766	1,796	2,946	3,999	—
Turkey (Asiatic).....	<sup>13</sup> 102,116	89,532	53,831	113,255	100,433	73,970	—
Syria and Lebanon.....	—	9,028	9,582	4,312	14,000	12,000	17,000
Russia <sup>14</sup> .....	901,400	831,000	1,090,000	1,250,000	1,310,000	1,550,000	1,190,000
Iraq.....	—	2,601	1,506	4,353	3,974	2,625	—
Persia <sup>4</sup> .....	<sup>4</sup> 1,136,000	77,531	75,007	91,735	67,638	—	3,349,000
India.....	3,575,000	4,866,000	4,990,000	4,838,000	4,289,000	4,033,000	3,349,000
China <sup>15</sup> .....	—	2,072,000	1,875,000	2,466,000	2,116,000	2,250,000	1,800,000
Japanese Empire:							
Japan.....	4,701	1,502	1,100	943	724	—	—
Chosen (Korea).....	20,392	134,317	133,239	119,875	138,942	151,000	136,000
French Indo-China.....	<sup>4</sup> 13,800	5,577	5,067	6,121	8,120	<sup>15</sup> 5,772	—
Dutch East Indies <sup>4</sup> .....	<sup>18</sup> 18,242	5,171	5,315	4,282	4,061	—	—
Siam.....	<sup>4</sup> 3,633	3,470	2,885	2,766	3,200	—	—
Total Asiatic countries reporting 1927-28 to 1930-31.....	—	—	8,159,990	8,833,715	7,983,415	8,085,376	—
<b>OCEANIA</b>							
Australia.....	73	7,030	7,714	5,036	8,394	9,500	—
New Hebrides.....	<sup>7</sup> 517	2,485	2,582	1,542	2,249	—	—
Total Oceania reporting 1927-28 to 1930-31.....	—	7,030	7,714	5,036	8,394	9,500	—
Total all countries re- porting 1927-28 to 1930- 31.....	—	—	23,395,486	26,258,616	25,640,470	24,789,152	—
Estimated world total, including China.....	20,900,000	26,400,000	24,000,000	26,900,000	26,500,000	23,600,000	27,300,000

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture except as otherwise stated. Data for crop year as given at the head of the table are for crops harvested between Aug. 1 and July 31. For the United States prior to 1914 the figures apply to the year beginning Sept. 1.

<sup>4</sup> Exports.

<sup>7</sup> Average for 4 years.

<sup>8</sup> Average for 2 years.

<sup>9</sup> Average for 3 years.

<sup>10</sup> For season 1910-11.

<sup>11</sup> It is estimated that in 1930-31, 8.4 per cent and in 1931-32, 10.6 per cent of the total acreage was in European Russia.

<sup>12</sup> Estimates of Bureau of Agricultural Economics.

<sup>13</sup> From an unofficial source.

<sup>14</sup> Estimates of the Chinese Mill Owners' Association, except figures for 1930-31 and 1931-32, which are estimates of this bureau. The figures represent the crop in the most important Provinces where the commercial crop is grown.

<sup>15</sup> Includes Annam and Tonkin.

TABLE 132.—Cotton: Supply and distribution, United States, 1913-14 to 1930-31

Year beginning August	Supply					Distribution					
	Production	Carry-over from previous season		Im-ports	Total supply	Consumption		Ex-ports	Stocks on hand at end of year		Total distribution <sup>1</sup>
		For- eign	Total			For- eign	Total		For- eign	Total	
	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales
1913-14	13,983	83	1,511	261	15,755	194	5,577	8,555	73	1,366	15,598
1914-15	15,906	73	1,366	382	17,654	222	5,597	8,323	145	3,936	17,856
1915-16	11,068	145	3,936	438	15,442	317	6,398	5,896	212	3,140	15,434
1916-17	11,364	212	3,140	292	14,796	318	6,789	5,303	143	2,720	14,812
1917-18	11,248	143	2,720	221	14,189	184	6,566	4,288	111	3,450	14,304
1918-19	11,906	111	3,450	202	15,558	176	5,766	5,592	83	4,287	15,645
1919-20	11,326	83	4,287	700	16,313	417	6,420	6,545	284	3,563	16,528
1920-21	13,271	284	3,563	226	17,060	216	4,893	5,745	174	6,534	17,172
1921-22	7,978	174	6,534	363	14,875	297	5,910	6,184	167	2,832	14,926
1922-23	9,729	167	2,832	470	13,081	344	6,666	4,823	196	2,325	13,814
1923-24	10,171	196	2,325	292	12,788	328	5,681	5,656	116	1,556	12,893
1924-25	13,639	116	1,556	313	15,508	276	6,193	5,005	106	1,610	15,808
1925-26	16,123	106	1,610	326	18,059	280	6,456	5,051	129	3,543	18,060
1926-27	17,755	129	3,543	401	21,699	309	7,190	10,927	99	3,762	21,879
1927-28	12,783	99	3,762	338	16,883	299	6,834	6,540	111	2,536	16,910
1928-29	14,297	111	2,536	468	17,291	313	7,091	5,044	182	2,312	17,447
1929-30	14,548	182	2,312	378	17,238	302	6,106	6,690	209	4,530	17,326
1930-31	13,756	209	4,530	108	18,394	179	5,263	6,760	107	6,370	18,393

Bureau of Agricultural Economics. Compiled from Bureau of Census Reports. Linters are excluded. Quantities are in running bales, round bales counted as half bales and foreign in 500-pound bales.

<sup>1</sup> Total distribution usually is greater than total supply due principally to the inclusion, in all distribution items, of the "city crop," which consists of rebaled samples and pickings from cotton damaged by fire and weather.

TABLE 133.—Cotton: Mill consumption of American and other growths in the world, United States, and foreign countries, 1913-14 to 1930-31

Year beginning August <sup>1</sup>	World			United States			Foreign countries		
	All growths	American	Other growths	All growths	American	Other growths	All growths	American	Other growths
	1,000 bales <sup>2</sup>	1,000 bales <sup>2</sup>	1,000 bales <sup>2</sup>	1,000 bales <sup>2</sup>	1,000 bales <sup>2</sup>	1,000 bales <sup>2</sup>	1,000 bales <sup>2</sup>	1,000 bales <sup>2</sup>	1,000 bales <sup>2</sup>
1913-14.....	22,200	13,825	8,375	5,577	5,383	194	16,623	8,442	8,181
1914-15.....	20,671	13,249	7,422	5,597	5,375	222	15,074	7,874	7,200
1915-16.....	21,978	13,039	8,939	6,398	6,081	317	15,580	6,958	8,622
1916-17.....	21,109	12,561	8,518	6,769	6,470	319	14,320	6,091	8,229
1917-18.....	18,116	10,671	7,645	6,566	6,382	184	11,950	4,489	7,461
1918-19.....	16,705	9,909	6,796	5,766	5,590	176	10,939	4,319	6,620
1919-20.....	19,300	11,898	7,402	6,420	6,003	417	12,880	5,895	6,985
1920-21.....	16,905	10,268	6,637	4,893	4,677	216	12,012	5,591	6,421
1921-22.....	19,990	12,209	7,781	5,910	5,613	297	14,080	6,596	7,484
1922-23.....	21,225	12,446	8,879	6,666	6,322	344	14,639	6,124	8,515
1923-24.....	19,782	10,917	9,065	5,681	5,353	328	14,301	5,564	8,737
1924-25.....	22,612	13,311	9,331	6,193	5,917	276	16,449	7,364	9,055
1925-26.....	23,930	14,010	9,920	6,456	6,176	280	17,474	7,834	9,640
1926-27.....	25,860	15,748	10,121	7,190	6,850	310	18,679	8,863	9,811
1927-28.....	25,285	15,676	9,709	6,834	6,535	299	18,451	9,041	9,410
1928-29.....	25,732	15,226	10,556	7,091	6,778	313	18,691	8,448	10,243
1929-30.....	24,878	13,021	11,857	6,106	5,803	303	18,772	7,213	11,559
1930-31.....	22,402	11,113	11,289	5,263	5,084	179	17,139	6,029	11,110

Bureau of Agricultural Economist. Compiled from reports of the Bureau of the Census, U. S. Department of Commerce, except consumption figures for American cotton in foreign countries which are from the 1931 Cotton Year Book of the New York Cotton Exchange. The consumption figures for Other Growths in the world and in foreign countries were obtained by deduction.

<sup>1</sup> Year beginning Aug. 1, except 1913, which is the year beginning Sept. 1.

<sup>2</sup> American in running bales and other growths in bales of 478 pounds net. Prior to 1919-20 the quantities given for world consumption of all growths were reported in bales of 500 pounds net and have been converted to equivalent 478 pounds bales.

TABLE 134.—Cotton: Consumption by domestic mills, 1919-20 to 1930-31, inclusive

Month	Crop year											
	1919-20	1920-21	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31
	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales
August.....	497	484	487	523	492	357	451	500	634	526	559	353
September.....	491	458	485	494	436	438	453	571	623	492	546	393
October.....	550	401	494	534	543	534	544	583	614	616	640	443
November.....	491	333	528	579	533	495	544	584	627	611	541	475
December.....	512	285	511	529	464	534	576	603	639	533	453	408
January.....	532	367	527	610	578	594	582	603	586	688	576	450
February.....	516	395	472	567	509	551	565	590	573	595	494	433
March.....	576	438	520	624	486	583	636	603	581	632	508	401
April.....	567	409	444	577	479	597	573	618	525	632	532	509
May.....	541	441	495	621	414	532	516	630	577	669	473	465
June.....	555	463	509	542	350	494	519	660	510	570	405	454
July.....	526	410	458	483	347	484	462	570	440	547	379	451
Total.....	6,420	4,893	5,910	6,668	5,681	6,193	6,456	7,190	6,834	7,091	6,108	5,263

Bureau of the Census. Quantities are in running bales, round counted as half bales and foreign in 500 pound bales. Linters not included.

TABLE 135.—Cotton: International trade, average, 1925-26 to 1929-30; annual, 1927-28 to 1930-31

Country	Year beginning July									
	Average, 1925-26 to 1929-30		1927-28		1928-29		1929-30		1930-31 <sup>1</sup>	
	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
<b>PRINCIPAL EXPORTING COUNTRIES</b>	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales	1,000 bales
United States.....	8,579	399	7,890	367	8,520	470	7,086	414	7,048	107
British India.....	2,938	176	2,528	167	3,290	88	3,270	117	3,152	388
Egypt.....	1,484	0	1,377	0	1,645	0	1,394	0	1,283	0
Brazil.....	119	0	62	0	63	0	280	0	108	0
Argentina.....	58	*1	41	1	113	129	129	107	107	1
Total.....	13,208	576	11,898	535	13,581	564	12,179	531	11,699	496
<b>PRINCIPAL IMPORTING COUNTRIES</b>										
United Kingdom.....	0	3,070	0	2,460	0	3,168	0	2,648	0	2,172
Japan.....	0	2,061	0	2,617	0	3,110	0	2,859	0	2,777
Germany.....	325	1,900	392	2,563	333	1,757	393	1,780	358	1,645
France.....	100	1,640	122	1,023	108	1,669	50	1,650	43	1,644
Italy.....	1	1,053	1	982	0	1,121	2	1,103	1	791
Czechoslovakia.....	4	567	2	620	1	566	1	518	1	450
Belgium.....	14	397	18	376	21	406	21	435	25	358
Poland.....	0	283	0	353	0	309	0	225	0	282
Canada.....	0	271	0	261	0	306	0	218	0	209
Netherlands.....	2	192	1	193	2	208	1	214	1	215
Austria.....	1	149	0	175	1	147	1	119	0	99
Switzerland.....	0	141	0	134	0	139	0	136	0	123
Sweden.....	0	106	0	111	0	101	0	105	0	90
Finland.....	0	39	0	46	0	38	0	30	0	36
Hungary.....	0	37	0	33	0	46	0	60	0	61
Estonia.....	0	25	0	26	0	24	0	28	0	18
Denmark.....	0	21	0	24	0	20	0	27	0	28
Norway.....	0	9	0	9	0	7	0	9	0	10
Total.....	447	12,961	536	12,615	486	13,142	400	12,164	442	11,084

Bureau of Agricultural Economics. Official sources except where otherwise noted. Bales of 500 pounds gross weight or 473 pounds net. The figures for cotton refer to ginned and unginned cotton and linters but not to mill waste, cotton bating, soarto (Egyptian and Sudan). Wherever unginned cotton has been separately stated in the original reports, it has been reduced to ginned cotton in this statement at the ratio of 3 pounds unginned to 1 pound ginned. Wherever linters are stated separately, they have been excluded from these figures.

<sup>1</sup> Preliminary.

<sup>2</sup> 3-year average.

TABLE 136.—Cotton, Middling: Average spot price per pound at 10 markets in stated years

Market and crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
Norfolk:	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1930-31	11.93	10.80	10.28	10.61	9.67	9.79	10.68	10.63	10.00	9.24	8.80	8.98	10.11
1931-32	6.96	6.28	6.20	6.33	6.14								
Augusta:													
1930-31	11.28	10.19	9.91	10.22	9.25	9.42	10.28	10.30	9.67	8.87	8.56	8.79	9.73
1931-32	6.83	6.99	5.97	6.16	5.99								
Savannah:													
1930-31	11.11	10.30	10.06	10.38	9.43	9.56	10.41	10.41	9.79	8.84	8.61	8.80	9.81
1931-32	6.68	6.06	5.90	6.13	5.94								
Montgomery:													
1930-31	10.72	9.72	9.43	9.90	8.90	8.99	9.73	9.77	9.26	8.37	8.16	8.36	9.28
1931-32	6.30	6.62	5.56	5.73	5.55								
Memphis:													
1930-31	10.88	9.78	9.34	9.59	8.71	9.01	9.65	9.74	9.05	8.38	8.16	8.36	9.22
1931-32	6.20	5.89	5.52	5.69	5.55								
Little Rock:													
1930-31	10.78	9.70	9.29	9.47	8.59	8.85	9.52	9.57	8.93	8.27	8.02	8.27	9.10
1931-32	6.13	5.29	5.36	5.57	5.46								
Dallas:													
1930-31	10.64	9.71	9.41	9.63	8.72	9.07	9.77	9.78	9.07	8.26	7.91	8.35	9.19
1931-32	6.23	5.47	5.35	5.61	5.42								
Houston:													
1930-31	11.24	10.33	9.99	10.22	9.31	9.56	10.28	10.31	9.60	8.79	8.54	8.70	9.74
1931-32	6.62	5.95	5.72	5.90	5.73								
Galveston:													
1930-31	11.28	10.37	10.09	10.30	9.34	9.62	10.33	10.37	9.72	8.90	8.64	8.82	9.82
1931-32	6.72	6.06	5.82	6.02	5.94								
New Orleans:													
1909-10	12.28	12.66	13.48	14.40	14.96	15.23	14.88	14.74	14.64	14.89	14.85	14.93	14.33
1910-11	14.02	13.49	14.21	14.50	14.85	14.95	14.62	14.54	14.70	15.48	15.26	14.30	14.65
1911-12	11.96	11.29	9.61	9.35	9.17	9.53	10.31	10.65	11.01	11.72	12.07	12.93	10.85
1912-13	12.07	11.87	10.95	12.15	12.81	12.58	12.61	12.45	12.44	12.29	12.44	12.94	12.20
1913-14	12.02	13.11	13.73	13.26	12.98	12.93	12.60	12.95	13.11	13.56	13.79	13.34	13.12
1914-15	(1)	8.42	7.02	7.43	7.18	7.87	8.01	8.34	9.43	9.04	9.12	8.71	
1915-16	8.94	10.40	11.95	11.50	11.89	12.04	11.45	11.73	11.89	12.51	12.80	13.03	11.68
1916-17	14.26	15.37	17.24	19.45	18.34	17.33	17.14	17.94	18.51	20.06	24.18	25.41	18.84
1917-18	25.07	21.68	23.76	28.07	28.07	31.07	30.91	32.76	33.05	28.90	30.71	29.50	28.06
1918-19	30.28	33.22	31.18	29.75	28.44	28.84	26.97	26.84	20.70	20.22	32.00	33.93	29.37
1919-20	31.38	30.38	35.28	39.58	39.89	40.28	39.39	40.69	41.41	40.31	40.49	39.41	38.31
1920-21	34.03	27.48	20.95	17.65	14.69	14.53	12.85	11.08	11.17	11.80	11.03	11.49	15.55
1921-22	12.78	19.35	18.99	17.27	17.10	16.53	16.36	16.74	16.80	19.31	21.18	22.01	17.92
1922-23	21.55	20.74	22.05	25.34	25.48	27.51	28.78	30.43	28.42	29.63	28.61	25.73	25.94
1923-24	24.22	27.71	29.18	33.68	34.88	33.93	31.90	28.74	30.41	30.70	29.43	29.23	30.33
1924-25	26.65	22.79	23.43	23.95	23.66	23.66	24.61	25.52	24.52	23.54	24.07	24.05	24.21
1925-26	23.07	20.69	20.86	19.82	19.27	20.26	19.83	18.35	18.11	18.06	17.54	18.24	19.71
1926-27	18.01	16.14	12.68	12.52	12.22	13.17	13.82	14.10	14.42	15.68	16.47	17.63	14.74
1927-28	19.36	21.63	20.73	19.99	19.29	18.72	17.90	18.94	20.07	20.77	21.10	21.45	19.98
1928-29	19.00	17.94	18.79	19.00	19.36	19.14	19.07	19.97	19.23	18.74	18.81	18.73	18.98
1929-30	18.57	18.45	18.08	17.19	17.04	16.84	15.25	14.87	15.79	15.60	13.56	12.65	16.16
1930-31	11.56	10.58	10.40	10.63	9.65	9.87	10.63	10.59	9.95	9.08	8.86	9.10	10.08
1931-32	7.02	6.20	6.06	6.32	6.10								
10 markets combined:													
1915-16	8.80	10.29	11.99	11.49	11.97	12.10	11.54	11.78	11.94	12.67	12.89	13.11	11.72
1916-17	14.32	15.31	17.38	19.54	18.44	17.70	16.54	18.39	19.72	20.15	24.33	25.45	18.96
1917-18	25.26	22.08	26.80	28.21	29.19	31.05	30.97	32.54	32.87	29.32	30.10	29.44	29.02
1918-19	31.05	33.38	31.11	29.27	29.22	28.51	26.55	26.40	26.84	29.21	31.84	33.80	29.76
1919-20	31.60	30.30	35.44	39.59	39.70	40.46	39.49	40.69	41.74	41.01	40.58	39.58	38.34
1920-21	34.78	28.24	21.38	17.83	14.63	14.42	12.93	11.49	11.01	11.55	10.77	11.83	16.46
1921-22	12.53	10.50	19.25	17.43	17.47	17.04	16.73	17.12	16.92	19.22	21.58	22.27	18.09
1922-23	21.63	20.72	22.11	25.20	25.40	27.39	28.62	30.21	28.38	26.47	28.20	25.87	27.83
1923-24	24.22	27.67	28.90	33.30	34.39	33.69	31.73	28.51	30.25	30.32	29.87	29.32	30.14
1924-25	26.16	22.74	23.29	23.63	23.40	23.53	24.51	25.51	24.58	23.61	24.19	24.56	24.22
1925-26	23.35	23.23	22.95	19.92	19.31	20.04	19.63	18.39	18.05	17.95	17.52	17.92	19.68
1926-27	17.65	15.96	12.40	12.17	11.81	12.73	13.45	13.74	13.08	15.38	16.10	17.34	14.40
1927-28	19.16	21.19	20.35	19.74	18.99	18.44	17.60	18.76	19.76	20.54	20.82	21.25	19.72
1928-29	18.72	17.72	18.46	18.70	19.07	18.88	18.86	19.78	18.95	18.23	18.36	18.29	18.67
1929-30	18.04	18.01	17.62	16.75	16.64	16.50	15.11	14.74	15.40	15.12	13.21	12.21	15.79
1930-31	11.14	10.15	9.82	10.09	9.16	9.87	10.12	10.15	9.50	8.70	8.42	8.66	9.91
1931-32	6.57	5.83	5.75	5.95	5.78								

Bureau of Agricultural Economics. Prior to Aug. 16, 1915, compiled from quotations in Market Reports of the New York Cotton Exchange, except Sept. 23 to Nov. 16, 1914, when the exchange was closed, quotations for which time were taken from the New York Commercial and Financial Chronicle; from Aug. 16, 1915, compiled from daily reports to the bureau from the cotton exchanges of the various markets. Data for earlier years appear in previous issues of the Yearbook.

1 Market closed.

2 No quotations prior to Sept. 23. Average for 7 days' business.

3 Does not include New Orleans.

4 Does not include Savannah.

TABLE 137.—Cotton: Average staple premiums at New Orleans and discounts at New Orleans, Houston, and Galveston for Middling spot cotton, by months, 1924-25 to 1930-31

## PREMIUMS FOR STAPLES LONGER THAN ¾ INCH, NEW ORLEANS

Crop year and staple length	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
1924-25	Points	Points	Points	Points	Points	Points	Points	Points	Points	Points	Points	Points	Points
1½ inch.....	60	60	65	65	65	65	65	65	65	70	75	75	66
1 inch.....	75	75	75	75	80	80	85	80	90	110	120	110	88
1½ inches.....	100	106	123	125	125	160	175	175	250	250	250	230	171
1½ inches.....	175	175	175	225	250	300	400	400	550	530	550	500	302
1½ inches.....	275	281	300	375	400	530	650	650	800	500	800	800	555
1½ inches.....	400	412	450	525	550	820	1,000	1,000	1,150	1,150	1,150	1,150	813
1925-26													
1½ inch.....	75	75	75	75	85	100	90	80	80	75	75	75	80
1 inch.....	100	100	100	105	115	125	120	110	100	100	100	100	106
1½ inches.....	250	241	175	231	250	250	250	200	200	200	200	200	217
1½ inches.....	550	557	300	375	400	400	400	350	350	350	350	350	372
1½ inches.....	800	625	575	537	600	600	600	550	550	550	550	550	591
1½ inches.....	1,150	887	800	850	900	900	900	900	900	900	900	900	907
1926-27													
1½ inch.....	40	65	65	65	65	65	65	65	65	65	65	65	58
1 inch.....	75	110	110	100	100	100	100	100	100	100	100	100	100
1½ inches.....	200	200	125	135	150	150	150	150	150	200	200	200	168
1½ inches.....	350	350	235	235	250	250	250	250	250	300	300	300	277
1½ inches.....	550	550	410	450	450	450	450	450	450	500	513	500	484
1½ inches.....	900	900	670	800	840	875	900	900	900	900	900	900	730
1927-28													
1½ inch.....	40	40	40	40	30	40	35	35	25	20	20	20	34
1 inch.....	75	75	75	75	100	100	100	100	75	60	60	60	60
1½ inches.....	163	169	230	238	200	200	200	200	175	175	170	150	191
1½ inches.....	244	203	350	338	300	300	300	300	250	250	245	225	240
1½ inches.....	525	513	550	513	400	400	400	400	350	350	340	300	420
1½ inches.....	788	788	850	800	650	650	650	650	550	550	535	475	661
1928-29													
1½ inch.....	20	20	30	29	20	15	19	25	25	37	40	40	27
1 inch.....	60	60	84	95	85	75	75	75	92	104	118	125	87
1½ inches.....	150	150	150	150	150	150	150	150	165	200	200	225	162
1½ inches.....	225	206	200	200	200	200	200	200	230	275	300	300	220
1½ inches.....	300	300	300	300	300	300	300	300	340	345	400	425	323
1½ inches.....	475	494	458	450	450	450	450	450	540	540	675	750	510
1929-30													
1½ inch.....	40	31	30	30	40	40	50	30	50	50	50	50	43
1 inch.....	125	103	100	100	100	100	100	100	100	100	100	100	102
1½ inches.....	225	175	175	175	175	175	175	175	175	175	175	175	179
1½ inches.....	300	225	225	225	225	225	225	225	225	225	225	225	231
1½ inches.....	425	325	325	325	350	370	350	350	350	350	350	350	350
1½ inches.....	650	600	575	550	600	600	600	600	600	600	600	600	603
1930-31													
1½ inch.....	50	50	40	40	40	40	40	40	40	40	10	40	42
1 inch.....	100	100	75	75	75	75	75	75	75	75	75	75	70
1½ inches.....	175	175	150	150	150	150	150	150	150	150	150	150	154
1½ inches.....	225	225	175	175	175	175	175	175	175	175	175	175	183
1½ inches.....	350	350	300	300	300	300	300	300	300	300	300	300	308
1½ inches.....	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600

## DISCOUNTS: FOR 1½ INCH, AVERAGE OF NEW ORLEANS, HOUSTON, AND GALVESTON

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
1924-25.....	50	50	50	75	100	100	100	100	100	100	100	100	85
1925-26.....	150	150	150	150	150	125	125	100	100	100	100	100	125
1926-27.....	100	100	100	100	100	100	100	100	100	100	100	100	100
1927-28.....	75	75	75	100	125	125	100	100	100	100	75	75	94
1928-29.....	50	50	50	65	65	75	75	75	75	75	75	75	67
1929-30.....	75	75	100	125	150	150	125	100	100	100	100	100	108
1930-31.....	100	100	100	100	100	100	95	95	95	80	88	85	95

Bureau of Agricultural Economics. Based on weekly quotations for Middling ¾-inch staple. Premiums and discounts are stated in points or hundredths of a cent per pound. See Table 208, p. 852, 1928 Yearbook, for data for earlier years.

<sup>1</sup> Nominal.

<sup>2</sup> Discounts are calculated from actual sales and partially estimated.

TABLE 138.—Cotton: Average monthly premiums and discounts for grades <sup>1</sup> above and below Middling for the 10 designated spot markets, 1927-28 to 1930-31

Month and crop year	Middling fair	Strict Good Middling	Good Middling	Strict Middling	Middling (average price) <sup>2</sup>	Strict Low Middling	Low Middling	Strict Good Ordinary <sup>3</sup>	Good Ordinary <sup>3</sup>
August:	On <sup>4</sup>	On	On	On	Cents per lb.	Off <sup>4</sup>	Off	Off	Off
1927-28.....	130	106	76	51	19.16	103	213	333	448
1928-29.....	84	60	39	26	18.72	44	98	164	231
1929-30.....	80	62	43	32	18.04	75	160	250	340
1930-31.....	90	74	57	37	11.11	71	172	287	389
September:									
1927-28.....	125	102	73	49	21.19	100	211	333	447
1928-29.....	83	59	39	25	17.72	67	138	209	285
1929-30.....	72	55	40	25	18.01	75	159	252	342
1930-31.....	97	70	51	31	10.15	70	169	279	330
October:									
1927-28.....	124	101	68	48	20.35	82	187	307	417
1928-29.....	83	62	41	26	18.46	79	159	237	321
1929-30.....	74	56	42	26	17.62	77	165	268	359
1930-31.....	89	70	51	30	9.82	70	163	265	359
November:									
1927-28.....	105	83	60	41	19.74	48	124	221	314
1928-29.....	81	61	41	26	18.70	81	161	242	327
1929-30.....	78	60	46	30	16.75	78	170	278	375
1930-31.....	89	70	51	30	10.00	70	162	261	359
December:									
1927-28.....	94	69	45	30	18.99	36	85	162	241
1928-29.....	76	58	39	25	19.07	79	157	238	322
1929-30.....	83	67	52	37	16.61	75	173	280	378
1930-31.....	88	70	51	30	9.16	66	151	243	339
January:									
1927-28.....	93	68	44	29	18.44	35	80	150	227
1928-29.....	77	57	39	25	18.87	78	162	247	336
1929-30.....	103	85	69	49	16.56	75	170	280	378
1930-31.....	87	70	51	30	9.37	60	138	220	295
February:									
1927-28.....	91	65	40	25	17.60	34	74	146	220
1928-29.....	78	58	39	26	18.86	78	162	250	340
1929-30.....	107	89	72	50	15.11	75	170	280	378
1930-31.....	87	70	51	30	10.12	54	132	210	277
March:									
1927-28.....	91	65	40	25	18.76	38	73	138	213
1928-29.....	79	59	41	28	18.77	77	161	250	340
1929-30.....	105	88	72	50	14.74	73	174	282	384
1930-31.....	88	70	52	31	10.15	51	127	204	269
April:									
1927-28.....	90	64	39	25	19.77	33	73	138	213
1928-29.....	80	60	42	29	18.94	76	161	250	340
1929-30.....	100	86	72	50	15.40	72	178	280	395
1930-31.....	88	70	52	31	9.50	51	125	197	261
May:									
1927-28.....	89	64	40	25	20.53	33	77	143	218
1928-29.....	80	61	43	30	18.24	75	160	250	340
1929-30.....	101	86	71	49	15.12	72	173	280	394
1930-31.....	88	70	52	31	8.70	50	117	190	252
June:									
1927-28.....	87	63	40	26	20.82	34	80	147	222
1928-29.....	83	64	49	35	18.36	74	160	250	340
1929-30.....	101	86	71	49	13.21	72	175	283	395
1930-31.....	88	70	52	31	8.42	50	101	176	237
July:									
1927-28.....	85	61	39	26	21.25	37	86	158	227
1928-29.....	84	65	51	38	18.29	73	160	250	340
1929-30.....	101	86	71	50	12.21	71	175	283	395
1930-31.....	88	70	52	31	8.66	49	100	175	236
Average:									
1927-28.....	100	76	50	33	19.72	51	114	198	294
1928-29.....	81	60	42	28	18.07	73	153	236	322
1929-30.....	92	76	61	41	15.79	74	170	278	376
1930-31.....	88	70	52	31	9.61	59	138	226	304

Bureau of Agricultural Economics.

<sup>1</sup> White standards.<sup>2</sup> Based on 5/8-inch staple.<sup>3</sup> These grades are not deliverable on future contracts.<sup>4</sup> The differences are stated in terms of points or hundredths of a cent per pound. By "On" is meant that the stated number of points is to be added to the price of Middling and by "Off" is meant that the stated number of points is to be subtracted from the price of Middling.

TABLE 139.—Cotton: Estimated average price per pound received by producers, United States, 1922-23 to 1931-32

Crop year	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weighted average
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1922-23	20.9	20.6	21.2	23.1	24.2	25.2	26.8	28.0	27.6	26.2	25.9	24.8	22.8
1923-24	23.8	25.6	28.0	29.9	32.1	32.5	31.4	27.7	28.7	28.1	27.8	27.3	28.7
1924-25	27.8	22.2	23.1	22.5	22.2	22.7	23.0	24.5	23.7	23.0	23.0	23.4	22.9
1925-26	23.4	22.5	21.5	18.1	17.4	17.4	17.6	16.5	16.6	16.0	16.1	15.4	19.6
1926-27	16.1	16.8	17.7	11.0	10.0	10.6	11.5	12.5	12.3	13.9	14.8	15.5	12.5
1927-28	17.1	22.5	21.0	20.0	18.7	18.6	17.0	17.8	18.7	20.1	19.7	21.0	20.2
1928-29	18.8	17.6	18.1	17.8	18.0	17.9	18.0	18.8	18.5	18.0	17.9	17.8	18.0
1929-30	18.0	18.2	17.5	18.2	16.0	15.8	14.8	13.8	14.7	14.5	14.0	11.9	16.8
1930-31	11.4	9.9	9.2	9.6	8.7	8.6	9.1	9.6	9.3	8.8	7.7	8.5	9.5
1931-32	6.3	5.9	5.3	6.1	5.5								

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by bales marketed monthly. Mean of prices reported on 1st of month and 1st of succeeding month, August, 1909, to December, 1923.

TABLE 140.—Cotton: Average spot price per pound of specified descriptions at Liverpool, 1922-23 to 1931-32

Description and crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
American Middling: <sup>1</sup>	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1922-23	24.90	23.68	24.55	27.96	28.26	30.64	30.93	31.42	30.29	28.43	31.53	29.28	28.51
1923-24	28.18	31.09	31.96	35.74	36.00	34.33	32.53	29.77	33.15	32.00	30.74	30.33	31.90
1924-25	31.62	25.08	26.13	26.09	25.73	25.90	27.17	27.95	28.85	25.83	27.84	27.76	26.12
1925-26	26.28	26.23	23.17	21.51	20.31	21.68	21.40	20.32	20.31	20.73	19.98	19.76	21.82
1926-27	19.69	19.35	14.51	14.08	13.34	14.55	15.56	15.65	15.24	17.90	18.55	19.42	16.57
1927-28	21.10	24.17	23.36	22.73	21.98	21.68	20.63	21.80	22.75	23.52	23.82	24.44	22.66
1928-29	21.39	20.87	21.85	21.62	21.57	21.39	21.09	22.33	21.56	20.66	20.88	21.09	21.36
1929-30	21.01	20.95	20.47	19.61	19.22	18.97	17.38	16.83	17.67	17.47	16.16	15.47	18.43
1930-31	14.05	12.64	11.80	12.05	11.03	11.11	12.06	12.10	11.42	10.56	9.99	10.26	11.59
1931-32	7.92	7.71	7.65	7.70	7.38								
Egyptian uppers, good: <sup>2</sup>													
1922-23	28.1	27.4	27.3	30.7	31.2	31.9	32.5	33.9	33.0	30.4	31.9	31.0	30.8
1923-24	31.5	33.4	33.5	39.6	41.5	39.7	39.0	37.5	41.2	43.9	43.3	43.6	39.0
1924-25	45.6	35.5	34.3	35.4	37.5	40.3	41.3	45.1	43.6	42.1	41.6	41.4	40.0
1925-26	39.5	37.1	35.0	32.6	30.8	29.9	28.5	26.2	25.9	27.3	26.2	25.2	30.3
1926-27	26.0	28.0	23.8	22.2	19.4	21.8	24.3	23.5	23.3	26.7	28.3	30.2	24.4
1927-28	32.0	33.2	31.8	31.3	29.9	28.3	27.6	30.0	32.7	33.3	31.3	30.4	31.8
1928-29	27.1	25.1	25.9	25.6	25.5	25.5	25.0	26.7	25.7	24.0	23.5	23.7	25.3
1929-30	23.6	24.2	23.0	22.3	22.0	22.0	21.4	21.3	21.8	21.6	20.5	20.8	22.0
1930-31	19.1	18.0	14.5	14.0	13.0	13.4	15.0	15.0	14.0	13.4	12.6	13.1	14.6
1931-32	10.2	10.2	9.6	9.6	8.7								
No. 1 Oomras, fully good: <sup>3</sup>													
1922-23	19.8	18.9	18.8	20.6	20.5	21.9	22.2	21.7	20.7	19.4	20.8	20.2	20.5
1923-24	19.6	21.8	22.0	23.9	27.7	26.1	25.2	22.4	24.0	22.9	22.6	22.0	23.5
1924-25	23.4	19.7	22.3	23.3	23.5	22.6	28.5	23.2	22.2	21.2	21.6	22.0	22.4
1925-26	21.5	22.0	19.9	18.1	16.8	17.4	16.8	15.4	15.1	15.6	15.0	15.2	17.4
1926-27	15.5	15.4	12.5	12.1	11.5	12.5	13.3	13.4	13.9	15.4	16.2	17.0	14.1
1927-28	17.9	20.1	19.3	17.7	17.6	17.4	16.5	17.5	17.9	18.3	18.6	18.5	18.1
1928-29	16.0	14.7	15.7	15.9	16.4	17.1	15.8	16.9	15.5	14.8	15.1	15.3	15.8
1929-30	15.1	15.0	14.7	13.9	13.7	13.2	11.5	10.8	11.0	10.8	9.6	8.7	12.3
1930-31	7.8	7.8	7.7	8.2	7.4	7.4	8.4	8.4	7.9	7.5	7.3	7.8	7.8
1931-32	6.0	5.9	6.2	6.7	6.5								

Bureau of Agricultural Economics. Conversions at monthly average rates of exchange August 1922-December 1925 and September, 1931 to date, and at per January 1926-August 1931, as given in Federal Reserve Bulletins.

<sup>1</sup> International Yearbook of Agricultural Statistics, 1921, p. 443. London Economist, 1922 to August 1927. Subsequently from Liverpool Cotton Association Daily Report. Average of weekly quotations.

<sup>2</sup> London Economist, average of weekly quotations to August, 1927, inclusive. Subsequently from Liverpool Cotton Association Daily Report.

TABLE 141.—*Cottonseed: Estimated production, and estimated price December 1, by States, 1924-1931*

State	Production, year beginning August 1								Estimated price per short ton									
	1924	1925	1926	1927	1928	1929	1930	1931	1924	1925	1926	1927	1928	1929	1930	1931		
	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	Dol-lars	Dol-lars	Dol-lars	Dol-lars	Dol-lars	Dol-lars	Dol-lars	Dol-lars		
Missouri.....	86	133	97	51	65	98	87	120	32.40	36.00	16.80	36.90	35.00	31.00	22.00	10.50		
Virginia.....	17	23	23	14	19	21	19	19	36.30	35.00	26.00	42.00	41.00	30.00	20.00	11.00		
North Carolina.....	366	488	539	382	371	331	343	344	35.00	33.00	22.00	37.00	40.00	29.00	22.00	12.00		
South Carolina.....	357	391	448	324	322	368	444	450	30.10	32.00	21.00	39.50	39.00	28.00	22.00	12.00		
Georgia.....	445	516	604	488	457	590	707	619	34.10	33.00	21.00	38.50	37.00	28.00	21.00	11.50		
Florida.....	10	17	14	8	9	13	22	19	32.10	34.00	19.00	30.00	30.00	30.00	22.00	10.60		
Tennessee.....	157	229	200	159	190	229	167	269	35.20	25.50	19.00	37.00	38.00	29.00	21.75	9.10		
Alabama.....	438	602	605	529	492	596	655	636	34.30	29.00	19.00	37.00	38.00	29.00	20.00	11.00		
Mississippi.....	487	884	838	602	655	851	650	766	35.70	22.00	21.00	38.50	39.00	32.50	23.50	11.00		
Arkansas.....	496	711	687	444	554	638	388	825	33.20	18.30	17.50	36.50	37.50	29.00	21.00	9.00		
Louisiana.....	219	404	368	243	307	359	317	384	29.20	24.50	18.00	38.00	38.50	31.00	20.00	9.00		
Oklahoma.....	671	751	787	461	536	508	379	543	28.60	26.50	15.40	37.00	34.00	31.00	22.00	9.70		
Texas.....	2,197	1,849	2,496	1,938	2,274	1,755	1,794	2,348	31.10	28.50	17.50	36.00	35.00	32.00	22.00	10.30		
New Mexico.....	25	30	33	31	39	40	44	44	30.00	28.00	18.00	30.00	32.00	28.00	22.00	11.00		
Arizona.....	48	53	54	41	66	68	69	53	21.20	26.60	18.00	30.00	30.00	28.00	20.00	10.00		
California.....	35	54	58	40	76	115	117	80	40.00	40.00	20.00	37.50	51.50	27.00	21.00	12.80		
All other.....	6	11	8	4	3	4	3	4	34.00	36.00	20.00	37.25	37.33	29.25	21.29	10.25		
United States.....	6,051	7,150	7,982	5,759	6,435	6,590	6,185	7,523	32.39	27.27	18.68	36.80	36.28	30.33	21.61	10.45		

Bureau of Agricultural Economics.

<sup>1</sup> Compiled from reports of Bureau of Census. Estimated production of lint, by States (December preliminary estimate for 1931), in rounded thousands of 500 pounds gross weight bales, adjusting for net weight and assuming 65 pounds of cottonseed for each 35 net pounds of lint.

TABLE 142.—*Cottonseed oil: International trade, average 1925-1929, annual 1927-1930*

Country	Calendar year									
	Average, 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports
PRINCIPAL EXPORTING COUNTRIES	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
United States.....	49,815	0	67,982	0	51,702	0	26,075	0	28,297	0
United Kingdom.....	41,140	18,657	47,044	17,815	35,708	18,742	53,715	23,090	38,835	36,035
Egypt.....	22,724	80	31,229	0	17,579	3	26,181	2	24,717	0
Peru.....	9,526	0	15,596	0	11,077	0	3,047	0	6,947	0
Brazil.....	351	23	0	16	21	0	1	4	2,314	2
Algeria.....	38	29	25	25	2	2	46	5	-----	-----
Total.....	128,600	18,789	161,876	17,416	116,179	18,745	109,065	23,101	101,110	36,037
PRINCIPAL IMPORTING COUNTRIES										
Canada.....	0	39,439	0	54,118	0	44,324	0	38,675	0	27,171
Germany.....	283	19,296	34	25,897	20	12,984	912	13,649	1,472	12,243
Netherlands.....	6,481	16,831	9,838	24,370	7,264	8,685	3,815	7,474	119	810
France.....	34	7,933	55	7,597	2	7,142	52	8,528	61	8,536
Denmark.....	809	6,624	609	6,131	1,224	6,493	1,369	7,378	-----	4,685
Norway.....	0	4,474	0	5,582	0	2,798	0	2,645	0	1,364
Cuba.....	0	4,099	0	6,081	0	1,857	0	419	0	1,824
Sweden.....	447	2,324	1,097	3,295	49	2,721	473	3,071	-----	3,682
Belgium.....	15	2,480	4	3,918	51	2,026	11	1,732	102	687
Australia <sup>2</sup> .....	1	1,914	3	1,664	0	2,967	0	2,651	-----	-----
Greece.....	0	1,478	0	3,315	0	1,201	0	494	0	36
Argentina.....	53	1,470	210	2,461	17	946	27	1,340	6	147
Gambia <sup>3</sup> .....	9	622	0	688	4	979	40	453	-----	-----
Yugoslavia.....	0	498	0	647	0	368	0	181	0	47
Uruguay.....	0	293	0	565	0	331	0	339	0	-----
Czechoslovakia.....	0	267	0	130	0	281	0	328	0	210
Italy.....	1	216	1	59	0	327	2	358	1	290
Total.....	8,133	110,758	11,851	146,498	8,631	96,430	6,701	89,768	1,761	61,488

Bureau of Agricultural Economics. Official sources except where otherwise noted.

<sup>1</sup> Preliminary.<sup>2</sup> International Yearbook of Agricultural Statistics.<sup>3</sup> 4-year average.

TABLE 143.—*Cottonseed: Estimated average price per ton received by producers, United States, 1922-23 to 1931-32*

Crop year	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weight- ed average
	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1922-23	32.44	25.37	31.79	40.18	42.93	43.35	45.16	46.32	47.60	46.58	43.14	41.42	34.70
1923-24	37.47	40.88	40.90	45.92	45.54	44.37	43.27	41.34	40.42	40.53	39.96	39.07	42.23
1924-25	38.44	31.74	31.95	33.57	35.49	37.50	37.14	38.21	37.94	38.61	36.66	36.41	34.08
1925-26	36.52	33.48	32.82	27.64	27.87	28.40	29.06	29.47	31.51	30.84	31.89	31.31	30.82
1926-27	29.73	27.38	20.06	18.66	18.05	18.55	22.39	25.43	25.80	26.05	26.27	26.59	21.55
1927-28	25.95	34.41	36.60	37.51	37.14	37.40	37.44	37.77	39.40	43.00	41.25	39.27	35.94
1928-29	36.87	31.02	34.08	37.17	37.74	38.05	38.73	39.36	38.94	37.78	35.83	34.84	35.26
1929-30	32.69	31.03	31.40	30.75	30.31	28.95	28.89	28.63	29.74	30.61	29.66	27.35	30.43
1930-31	23.99	23.89	20.73	21.26	21.28	21.25	21.87	22.43	22.85	22.32	20.32	19.52	21.98
1931-32	14.71	8.93	7.66	11.61	11.01								

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly receipts at oil mills.

TABLE 144.—*Cottonseed and cottonseed products: Production in the United States, 1909-10 to 1930-31*

Year beginning August	Cottonseed		Cottonseed products			Year beginning August	Cottonseed		Cottonseed products		
	Pro-duced	Crushed	Crude oil	Cake and meal	Hulls		Pro-duced	Crushed	Crude oil	Cake and meal	Hulls
	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons		1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons
1909-10	4,462	3,269	491	1,326	1,289	1920-21	5,971	4,069	655	1,786	1,256
1910-11	5,175	4,106	630	1,792	1,375	1921-22	3,531	3,008	465	1,355	937
1911-12	6,997	4,921	756	2,151	1,642	1922-23	4,336	3,242	501	1,487	944
1912-13	6,104	4,580	697	1,999	1,540	1923-24	4,502	3,308	490	1,518	941
1913-14	6,305	4,848	725	2,220	1,400	1924-25	6,051	4,605	702	2,126	1,331
1914-15	7,186	5,780	860	2,648	1,677	1925-26	7,150	5,558	809	2,597	1,547
1915-16	4,992	4,202	627	1,923	1,220	1926-27	7,989	6,306	944	2,840	1,854
1916-17	5,113	4,479	704	2,225	969	1927-28	5,758	4,654	738	2,063	1,320
1917-18	5,040	4,252	656	2,068	996	1928-29	6,435	5,061	802	2,282	1,368
1918-19	5,360	4,479	663	2,170	1,137	1929-30	6,590	5,016	786	2,232	1,384
1919-20	5,074	4,013	606	1,817	1,143	1930-31	6,185	4,714	721	2,162	1,303

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census.

TABLE 145.—*Cottonseed oil, crude: Average price per pound in tanks, f. o. b. southeast mills, by months, 1922-23 to 1931-32*

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1922-23	8.50	6.46	7.34	8.30	8.52	9.84	9.92	10.45	10.25	9.88	9.75	9.00	9.02
1923-24		9.94	9.44	9.88	9.45	9.46	8.84	8.46	8.74	8.20	8.78	10.06	
1924-25	11.30	8.34	9.03	8.85	9.69	9.48	9.20	9.95	10.00	9.34	9.75		
1925-26		9.14	8.55	8.90	8.98	9.75	10.71	11.00	11.22	12.17			
1926-27	10.88	8.19	7.44	6.64	6.36	6.94	8.20	7.73	7.33	7.74	8.04		
1927-28	8.70	9.25	9.45	9.06	8.72	8.48	7.75	8.44	8.75	8.88			
1928-29		8.16	8.14	8.24	8.88	8.63	9.12	9.00	8.37	7.94			
1929-30		7.66	7.33	7.38	7.28	7.24	7.40	7.13	7.48	7.32	6.95	7.00	
1930-31	6.76	6.48	6.14	6.35	6.12	6.18	6.37	6.75	6.72	6.88	6.27		
1931-32		3.60	3.54	3.80	3.83								

Bureau of Agricultural Economics. Compiled from the Oil, Paint, and Drug Reporter; prices, 1922-23 to 1927-28 are averages of weekly quotations; beginning 1928-29, averages of daily quotations.

Data for 1909-10 to 1921-22 are available in the 1930 Yearbook, p. 695, Table 149.

<sup>1</sup> Less than 10 quotations during the month. Other quotations were bids.

TABLE 146.—*Cottonseed oil, prime summer yellow: Average spot price per pound, New York, 1922-23 to 1931-32*<sup>1</sup>

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1922-23	9.06	8.84	8.88	9.51	9.81	10.77	10.60	11.78	11.76	11.60	11.48	10.85	10.44
1923-24	10.34	11.62	12.01	11.67	11.00	11.00	10.03	9.77	10.09	9.82	10.42	11.98	10.81
1924-25	13.83	10.54	11.00	10.56	11.41	11.10	10.69	11.10	11.08	10.51	10.75	11.38	11.19
1925-26	11.09	10.81	9.86	10.32	10.47	11.33	11.28	12.24	12.38	14.48	15.38	14.99	12.05
1926-27	12.99	11.42	8.82	8.20	8.22	8.60	9.31	9.39	8.78	9.09	8.19	9.57	9.46
1927-28	9.89	10.74	10.83	10.55	10.06	10.02	9.27	9.64	10.04	10.52	10.22	10.03	10.15
1928-29	9.44	10.03	9.84	9.69	10.21	20.33	10.88	10.74	10.11	9.75	9.64	9.62	10.02
1929-30	9.27	9.19	9.23	9.01	8.77	8.46	8.46	8.41	8.80	8.76	8.23	7.99	8.72
1930-31	8.34	8.20	7.60	7.57	7.28	7.20	7.29	7.53	7.55	6.99	6.76	7.00	7.45
1931-32	5.77	4.39	4.45	4.55	4.09								

Bureau of Agricultural Economics. Compiled from Oil, Paint, and Drug Reporter average of daily ranges. Data for 1890-91 to 1921-22 are available in 1924 Yearbook, p. 766, Table 323.

<sup>1</sup> Prices through July, 1930, quoted in barrels; beginning August, 1930, quoted in tanks.

TABLE 147.—*Cottonseed meal, 41 per cent protein: Price per ton, Memphis, 1922-23 to 1931-32*

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1922-23	35.30	34.30	40.25	46.00	45.40	45.75	45.00	43.60	43.10	42.40	40.80	41.40	41.90
1923-24	43.20	42.90	44.90	47.40	45.00	43.60	41.00	39.00	39.50	39.50	40.25	43.60	42.50
1924-25	43.60	41.40	40.75	38.75	39.25	37.70	35.75	35.00	36.80	38.40	38.80	41.50	39.00
1925-26	44.10	36.90	34.40	34.10	34.00	32.60	31.10	31.00	31.90	30.70	31.00	31.10	33.40
1926-27	32.10	28.90	23.90	23.70	24.50	30.10	33.50	32.40	32.50	34.00	37.40	36.00	30.75
1927-28	(1)	37.40	37.70	39.60	41.40	40.40	45.10	49.30	55.50	61.50	(1)	41.50	
1928-29	(1)	38.40	43.90	44.20	45.60	44.90	44.40	42.70	38.75	35.50	34.25	38.75	
1929-30	(1)	41.00	39.30	37.80	37.00	35.40	33.50	33.60	36.75	38.00	35.50	33.00	
1930-31	36.25	30.90	27.50	27.60	25.60	25.75	21.90	20.40	20.25	21.60	22.40	21.20	26.60
1931-32	17.30	13.80	13.20	16.60	14.45								

Bureau of Agricultural Economics. Compiled from reports made to the bureau.

<sup>1</sup> Not reported.

TABLE 148.—*Cottonseed meal, 41 per cent protein, bagged: Average price per ton at 11 markets, 1931*

Market	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
Boston	31.00	31.00	34.20	34.60	33.40	31.00	30.90	26.40	22.25	22.25	26.30	23.60
Philadelphia	33.75	33.00	33.40	33.90	32.20	32.80	29.20	26.00		22.20	25.30	23.00
Buffalo	32.30	31.40	32.60	32.50	29.50	29.10	28.00	23.90	20.75	19.60	23.00	20.80
Pittsburgh	32.40	31.40	32.00	32.75	30.80	28.40	27.50	23.20	19.60	19.50	22.70	20.00
Cincinnati	31.00	30.00	30.60	31.10	29.40	27.20	28.20	22.20	18.30	17.90	21.25	19.30
Chicago	30.20	29.80	30.70	31.00	28.90	26.75	26.00	22.10	18.90	17.60	21.40	19.10
Milwaukee	29.00	29.25	31.10	30.60	30.50	27.50	27.80	23.00	19.50	18.70	22.20	20.40
Minneapolis	31.70	31.25	31.60	32.40	30.40		27.75			20.40	23.70	21.20
Los Angeles	33.00	31.50	28.60	28.00	26.00	26.00	22.50	21.60	21.25	29.10	28.40	
St. Louis	28.80	28.40	29.60	29.60	27.70	25.60	24.40	20.60	17.20	16.20	21.25	17.60
San Francisco	33.50	32.40	30.10	30.50	30.00	29.50	28.00	26.40	22.10	22.50	23.50	28.75

Bureau of Agricultural Economics. Compiled from reports made to the bureau.

TABLE 149.—*Sugar beets: Acreage, production, and value, United States,<sup>1</sup> 1911-1931*

Year	Acreage	Yield per acre	Production	Seasonal farm price per ton	Value	Year	Acreage	Yield per acre	Production	Seasonal farm price per ton	Value
	1,000 acres	Short tons	1,000 short tons	Dollars	1,000 dollars		1,000 acres	Short tons	1,000 short tons	Dollars	1,000 dollars
1911.....	474	10.7	5,062	5.50	27,841	1922.....	530	9.8	5,183	7.91	41,017
1912.....	555	10.2	5,648	5.82	32,871	1923.....	657	10.7	7,006	8.99	62,965
1913.....	580	10.1	5,856	5.69	33,491	1924.....	815	9.2	7,489	7.99	59,835
1914.....	483	11.6	5,585	5.45	30,438	1925.....	647	11.4	7,381	6.39	47,147
1915.....	611	10.7	6,511	5.67	36,950	1926.....	677	10.7	7,223	7.61	54,961
1916.....	665	9.4	6,238	6.12	38,139	1927.....	721	10.8	7,753	7.67	59,455
1917.....	665	9.0	5,980	7.39	44,192	1928.....	644	11.0	7,101	7.11	50,477
1918.....	594	10.0	5,949	10.00	59,494	1929.....	688	10.6	7,315	7.08	51,806
1919.....	692	9.3	6,421	11.74	75,420	1930.....	775	11.9	9,199	7.14	65,097
1920.....	872	9.8	8,538	11.63	99,324	1931.....	720	11.0	7,933	5.92	46,958
1921.....	815	9.6	7,782	6.35	49,392						

Bureau of Agricultural Economics.

<sup>1</sup> Most years from 1911 to 1923 include a small unknown quantity of beets grown in Canada for Michigan factories.<sup>2</sup> Preliminary.TABLE 150.—*Sugar beets: Acreage, production and value, by States, 1927-1931*

State	Acreage					Production					Yield per acre				
	1927	1928	1929	1930	1931	1927	1928	1929	1930	1931	1927	1928	1929	1930	1931
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	Short tons	Short tons	Short tons	Short tons	Short tons
Michigan.....	99	71	52	74	59	698	452	300	513	590	7.0	6.4	5.8	6.9	10.0
Nebraska.....	82	86	92	81	66	1,036	1,021	1,054	1,136	891	12.6	11.9	11.5	14.0	13.5
Montana.....	32	28	38	45	54	304	258	380	572	614	11.4	9.2	10.2	12.7	11.4
Idaho.....	29	27	48	44	34	381	297	492	446	299	13.1	11.0	10.2	10.1	8.8
Wyoming.....	37	44	47	46	49	431	462	487	646	556	11.6	10.5	10.4	14.0	11.4
Colorado.....	215	179	210	242	226	2,774	2,394	2,612	3,122	2,537	12.7	13.4	12.4	13.7	11.2
Utah.....	55	51	45	44	49	677	637	565	553	504	12.3	12.5	12.6	12.6	10.3
California.....	59	49	46	65	90	476	638	545	768	1,067	8.1	13.0	11.8	11.8	11.9
Other States <sup>1</sup> .....	110	109	110	134	93	916	942	874	1,253	875	8.3	8.6	8.0	9.3	9.4
United States.....	721	644	688	775	720	7,753	7,101	7,315	9,199	7,933	10.8	11.0	10.6	11.9	11.0
Canada for U.S. factories.....	11	2	6	8	(*)	69	10	51	63	3	6.3	6.0	8.5	7.9	8.0

State	Seasonal farm price					Value				
	1927	1928	1929	1930	1931	1927	1928	1929	1930	1931
	Dolls. per short ton	Dolls. per short ton	Dolls. per short ton	Dolls. per short ton	Dolls. per short ton	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars
Michigan.....	7.16	7.22	7.94	8.08	—	4,996	3,268	2,381	4,143	—
Nebraska.....	7.90	6.98	6.96	6.95	—	8,241	7,127	7,332	7,893	—
Montana.....	8.22	7.36	7.29	7.32	—	2,996	1,897	2,815	4,191	—
Idaho.....	7.50	7.44	7.17	7.41	—	2,854	2,210	3,530	3,302	—
Wyoming.....	7.67	7.21	7.18	7.19	—	3,308	3,326	3,495	4,044	—
Colorado.....	7.84	6.97	6.93	6.91	—	21,758	16,687	18,106	22,873	—
Utah.....	7.03	7.03	7.05	7.00	—	4,761	4,478	3,988	3,874	—
California.....	9.28	8.03	7.28	7.46	—	4,418	5,121	3,966	5,731	—
Other States <sup>1</sup> .....	—	—	7.09	7.22	—	—	—	6,194	9,046	—
United States.....	7.67	7.11	7.08	7.14	5.92	59,455	50,477	51,806	65,697	40,968

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<sup>1</sup> Preliminary.<sup>2</sup> Includes Ohio, Indiana, Illinois, Wisconsin, Minnesota, Iowa, North Dakota, South Dakota, Kansas, New Mexico, and Washington.<sup>3</sup> Less than 500 acres.

TABLE 151.—*Sugar beets: Acreage, yield per acre, and production in specified countries, 1929-1931*

Country	Acreage			Yield per acre			Production		
	1929	1930	1931 <sup>1</sup>	1929	1930	1931 <sup>1</sup>	1929	1930	1931 <sup>1</sup>
	1,000 acres	1,000 acres	1,000 acres	Short tons	Short tons	Short tons	1,000 short tons	1,000 short tons	1,000 short tons
Canada.....	43	52	52	8.5	9.1	9.7	364	471	504
United States.....	687	775	720	10.6	11.9	11.0	7,315	9,199	7,933
United Kingdom.....	231	319	234	9.7	9.8	9.6	2,244	3,428	2,246
Sweden.....	68	91	91	12.4	14.7	10.9	845	1,339	992
Denmark.....	74	86	75	13.5	13.7	12.2	1,000	1,179	915
Netherlands.....	136	142	91	16.7	16.6	12.3	2,271	2,356	1,117
Belgium.....	143	140	140	12.1	14.7	13.4	1,731	2,056	1,876
France.....	693	679	620	10.9	14.3	10.8	7,538	9,716	6,712
Spain.....	151	197	240	11.7	13.0	13.6	1,763	2,560	3,265
Italy.....	287	277	270	11.2	12.1	9.7	3,223	3,361	2,613
Germany.....	1,125	1,194	911	10.9	13.8	12.9	12,226	16,445	12,168
Austria.....	75	83	106	10.2	12.2	11.1	762	1,073	1,177
Czechoslovakia.....	608	614	441	10.1	11.5	11.7	6,121	7,078	5,144
Hungary.....	195	183	142	9.1	8.8	8.0	1,771	1,610	1,137
Yugoslavia.....	145	128	120	8.3	6.4	---	1,210	881	---
Rumania.....	122	113	50	8.1	8.3	---	984	935	---
Poland.....	590	457	380	9.3	11.4	---	5,479	5,200	---
Russia.....	1,905	2,825	3,694	3.6	5.9	---	6,887	16,721	18,739
Other <sup>2</sup> .....	75	78	65	7.6	8.9	---	572	691	---
Total countries reporting acreage and production, all years.....	6,421	7,692	7,857	---	---	---	56,062	78,592	66,538
Total, all countries reporting.....	7,353	8,468	8,472	---	---	---	64,307	86,239	---

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture.

<sup>1</sup> Preliminary. <sup>2</sup> Includes Irish Free State, Switzerland, Bulgaria, Latvia, Finland, and Australia.TABLE 152.—*Beet sugar: Production, United States, 1911-1931*

Year <sup>1</sup>	Factories operating	Acreage from which beets were harvested <sup>2</sup>	Beets paid for by factories	Beets sliced	Sugar produced (chiefly refined) <sup>3</sup>	Analysis of beets		Recovery of sucrose from beets <sup>4</sup>		Sugar produced per ton of beets		Beet pulp produced	
						Purity coefficient <sup>5</sup>	Percentage of sucrose <sup>6</sup>	Paid for	Sliced	Paid for	Sliced	Molasses pulp	Dry pulp other than molasses pulp
	Number	1,000 acres	1,000 short tons	1,000 short tons	1,000 short tons	Per cent	Per cent	Per cent	Per cent	Lbs.	Lbs.	1,000 short tons	1,000 short tons
1911.....	86	474	5,062	5,062	600	82.21	15.89	---	11.84	---	237	---	---
1912.....	73	555	5,224	5,224	693	84.49	16.31	---	12.26	---	245	---	---
1913.....	71	580	5,486	5,486	733	83.22	15.78	12.45	12.96	249	259	---	---
1914.....	80	483	5,585	5,288	722	83.89	16.38	12.93	13.65	259	273	---	---
1915.....	87	611	6,511	6,150	874	84.38	16.49	13.42	14.21	268	284	---	---
1916.....	74	665	6,228	5,920	821	84.74	16.30	13.18	13.86	264	277	---	---
1917.....	91	665	5,980	5,620	765	83.89	16.28	12.79	13.60	266	272	---	---
1918.....	86	594	5,949	5,578	761	84.70	16.18	12.79	13.64	256	273	---	---
1919.....	89	692	6,421	5,888	726	82.84	14.48	11.31	12.34	228	247	---	---
1920.....	97	872	8,536	7,991	1,089	83.95	15.98	12.75	13.63	255	273	---	---
1921.....	92	815	7,732	7,414	1,020	83.06	15.77	13.11	13.76	262	275	---	---
1922.....	81	530	5,183	4,963	875	83.78	15.44	13.02	13.61	260	272	---	---
1923.....	89	657	7,006	6,585	881	83.43	15.30	12.57	13.37	251	267	---	---
1924.....	90	817	7,513	7,075	1,090	85.03	17.19	14.51	15.41	290	308	---	---
1925.....	88	653	7,423	6,903	913	82.84	14.86	12.30	13.06	248	261	---	---
1926.....	78	687	7,300	6,782	897	84.03	14.94	12.29	13.23	246	265	74	78
1927.....	83	732	7,821	7,443	1,093	84.60	16.11	13.98	14.68	280	294	89	75
1928.....	82	646	7,111	6,880	1,061	85.52	16.73	14.92	15.42	298	308	64	70
1929.....	79	694	7,366	7,117	1,018	84.46	15.64	13.74	14.22	275	284	111	48
1930.....	77	783	9,262	8,789	1,208	83.79	15.22	13.00	13.70	280	274	150	60
1931 <sup>7</sup> .....	---	720	7,936	---	1,117	---	15.97	---	---	277	---	---	---

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Year shown is that in which beets were grown. Sugar-making campaign extends into succeeding year.<sup>2</sup> Including, in some years, a small acreage in Canada used by United States factories.<sup>3</sup> Includes a small quantity not made from beets, and also that made at the Johnstown, Colo., molasses factory.<sup>4</sup> Percentages of sucrose (pure sugar) in the total soluble solids of the beets.<sup>5</sup> Based upon weight of beets sliced, except possibly in a very few factories.<sup>6</sup> Sucrose actually extracted by factories (as percentage of weight of beets).<sup>7</sup> Preliminary.

TABLE 153.—*Sugar: Production in continental United States, Hawaii, Porto Rico, and the Philippine Islands, 1909-10 to 1930-31*

Year beginning July	Total cane and beet sugar (refined) <sup>1</sup>	Beet sugar (chiefly refined)	Cane sugar (chiefly raw)				
			Continental United States	Porto Rico	Hawaii	Philippine Islands	Total
	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>
1909-10	1,765,011	512,469	331,726	346,788	517,090	<sup>2</sup> 140,783	1,336,385
1910-11	1,829,946	510,172	355,040	349,840	566,821	168,254	1,439,955
1911-12	2,096,658	599,500	380,874	371,076	593,088	268,878	1,595,960
1912-13	2,057,179	692,556	162,573	398,004	546,524	345,077	1,452,178
1913-14	2,304,454	733,401	300,538	351,666	612,000	408,339	1,672,543
1914-15	2,282,021	722,054	246,620	346,490	646,000	421,192	1,660,302
1915-16	2,404,018	874,220	138,620	483,590	592,763	412,274	1,627,247
1916-17	2,590,239	820,657	310,900	503,081	644,663	425,266	1,883,910
1917-18	2,411,263	765,207	245,840	453,794	570,700	474,745	1,751,079
1918-19	2,399,820	760,960	284,400	406,002	600,312	453,346	1,744,060
1919-20	2,259,514	726,451	122,125	485,071	555,727	466,913	1,629,536
1920-21	2,761,304	1,089,021	176,114	489,818	521,579	589,437	1,776,948
1921-22	2,769,970	1,020,489	327,701	408,325	592,000	533,189	1,861,215
1922-23	2,250,865	675,000	295,735	379,172	537,000	475,325	1,687,232
1923-24	2,604,292	881,000	164,823	447,570	691,000	529,091	1,832,494
1924-25	3,252,954	1,090,000	58,453	660,411	769,000	779,610	2,297,470
1925-26	2,923,225	913,000	139,381	603,240	787,246	607,362	2,137,229
1926-27	3,019,707	897,000	47,166	628,124	811,333	766,902	2,254,536
1927-28	3,493,969	1,080,000	70,792	748,677	896,913	807,814	2,524,201
1928-29	3,493,853	1,061,000	132,053	586,761	899,101	938,954	2,551,869
1929-30	3,806,300	1,018,000	200,000	806,110	912,337	983,767	2,962,234
1930-31	3,905,815	1,208,000	184,000	783,163	<sup>3</sup> 915,000	<sup>3</sup> 983,100	2,866,263

Bureau of Agricultural Economics. Production data compiled from the following sources: United States from the Department of Agriculture, except cane sugar, 1909-10 and 1910-11, which are from Willet & Gray; Hawaii from Hawaiian Sugar Planters Association; Porto Rico and Philippines from official sources of those islands. Figures for earlier years appear in previous issues of the Yearbook.

<sup>1</sup> Cane sugar, raw, converted to refined basis by multiplying by the following factors: United States, 0.982; Porto Rico, 0.9393; Hawaii, 0.9358; Philippine Islands, 0.95.

<sup>2</sup> Exports.

<sup>3</sup> Unofficial.

TABLE 154.—*Cane sugar: Production of Hawaii, 1913-14 to 1930-31*

Year beginning October	Total acreage in cane	Cane used for sugar			Sugar produced		Sugar made per short ton of cane	Recovery of equivalent refined sugar from ground <sup>3</sup>
		Acreage harvested	Average yield per acre <sup>1</sup>	Production	As made	Equivalent refined <sup>2</sup>		
	<i>Acres</i>	<i>Acres</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Pounds</i>	<i>Per cent</i>
1913-14		112,700	43	4,900,000	612,000	573,000	250	11.69
1914-15	239,500	113,200	46	5,185,000	646,000	605,000	249	11.67
1915-16	246,332	115,419	42	4,859,424	592,763	554,708	244	11.42
1916-17	245,100	123,900	42	5,220,000	644,663	603,276	247	11.56
1917-18	276,800	119,800	41	4,855,000	576,700	539,676	238	11.12
1918-19	239,900	119,700	40	4,744,000	600,312	561,772	253	11.84
1919-20	247,900	114,100	39	4,473,000	555,727	520,049	240	11.63
1920-21	236,500	113,100	41	4,657,000	521,579	488,094	224	10.48
1921-22	229,000	124,000	41	5,088,000	592,000	554,000	235	10.89
1922-23	235,000	114,000	40	4,560,000	537,000	503,000	235	11.03
1923-24	232,000	111,000	51	5,661,000	691,000	647,000	244	11.43
1924-25	241,000	122,000	52	6,297,000	789,000	720,000	244	11.43
1925-26	237,774	122,309	53	6,495,688	787,246	736,705	242	11.34
1926-27	234,809	124,542	56	6,962,082	811,333	759,245	232	10.86
1927-28	240,769	131,534	59	7,707,330	896,918	839,836	233	10.89
1928-29	239,858	129,131	58	7,447,494	899,101	841,379	241	11.30
1929-30	242,761	133,840	59	7,853,439	912,357	853,784	232	10.87
1930-31	251,538	137,037	62	8,465,183	988,612	925,143	233	10.90

Bureau of Agricultural Economics. Estimates of the crop-reporting board prior to 1926. Since then data collected through the Hawaiian Sugar Planters' Association.

<sup>1</sup> Age of cane equals 18 to 22 months of growth.

<sup>2</sup> 1 ton of sugar as made is assumed to be equivalent to 0.9358 tons of refined, as tentatively recommended by the joint committee on sugar statistics of the Department of Commerce and the Department of Agriculture.

<sup>3</sup> Based upon tonnage of cane used.

TABLE 155.—Cane sugar: Production in Louisiana, 1911-1931

Year <sup>1</sup>	Factories operating	Cane used for sugar			Sugar produced		Recovery of equivalent refined sugar from cane ground <sup>4</sup>	Sugar made per ton of cane	Molasses made			
		Acreage	Average yield per acre <sup>2</sup>	Production	As made	Equivalent refined <sup>3</sup>			Total <sup>5</sup>	Per ton of sugar made	Per ton of cane used	
	Number	Acres	Short tons	Short tons	Short tons	Short tons	Per cent	Pounds	Gallons	Gallons	Gallons	
1911----	188	810,000	19.0	5,887,292	352,874	323,879	5.59	120	33,062,525	99	6.0	
1912----	126	197,000	11.0	2,162,574	153,573	143,130	6.62	142	14,302,169	98	6.0	
1913----	153	248,000	17.0	4,214,000	292,698	272,795	6.47	139	24,048,320	82	5.7	
1914----	149	213,000	15.0	3,199,000	242,700	226,200	7.07	152	17,177,443	71	5.4	
1915----	136	183,000	11.0	2,018,000	137,500	128,200	6.35	135	12,743,000	93	6.3	
1916----	150	221,000	18.0	4,072,000	303,900	283,200	6.95	149	26,154,000	86	6.4	
1917----	140	244,000	15.6	3,813,000	243,600	227,000	5.95	128	30,728,000	126	8.1	
1918----	134	231,200	18.0	4,170,000	280,900	261,800	6.28	135	28,049,000	100	6.7	
1919----	121	179,900	10.5	1,833,000	121,000	112,800	5.99	129	12,991,000	107	6.9	
1920----	122	182,843	13.6	2,492,524	169,127	157,628	6.32	136	16,856,867	100	6.6	
1921----	124	226,365	18.5	4,180,780	324,431	302,370	7.23	155	25,423,341	78	6.1	
1922----	112	241,433	15.6	3,778,110	295,095	275,029	7.28	156	22,718,640	77	6.0	
1923----	105	217,259	11.1	2,386,650	162,023	151,005	6.33	136	15,719,400	97	6.6	
1924----	82	163,000	7.6	1,228,000	88,000	82,000	6.68	144	9,590,000	109	7.8	
1925----	91	190,000	14.0	2,645,000	139,000	130,000	4.91	105	17,783,000	128	6.7	
1926----	54	128,000	6.8	864,000	47,000	44,000	5.09	109	6,614,000	141	7.7	
1927----	46	73,000	13.4	962,000	71,000	66,000	6.86	147	6,624,000	93	6.9	
1928----	55	115,000	16.2	1,860,000	132,000	123,000	6.61	142	13,535,000	103	7.3	
1929----	65	150,000	18.8	2,918,000	200,000	186,000	6.37	137	19,619,000	98	6.7	
1930----	61	149,000	17.1	2,599,000	184,000	171,000	6.68	144	16,887,000	92	6.6	
1931 <sup>6</sup> ----	-----	154,000	15.0	2,310,000	156,000	145,000	6.28	135	14,322,000	92	6.2	

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Sugar campaign, usually not ended before February following season of growth of cane.<sup>2</sup> Age of cane equals one growing season of about 9 months.<sup>3</sup> 1 ton of sugar as made is assumed to be equivalent to 0.932 tons of refined as tentatively recommended by the joint committee on sugar statistics of the Department of Commerce and the Department of Agriculture.<sup>4</sup> Based upon tonnage of cane used.<sup>5</sup> Figures for molasses, 1911-1914, are as reported by the Louisiana Sugar Planters' Association. Figures for later years as reported by Division of Crop and Livestock Estimates. For sirup production see Table 163.<sup>6</sup> Preliminary.

TABLE 156.—*Sugar: Production in specified countries, average 1909-10 to 1913-14 and 1921-22 to 1925-26, and annual 1928-29 to 1931-32*

## BEET SUGAR IN TERMS OF RAW SUGAR

Country	Average, 1909-10 to 1913-14 <sup>1</sup>	Average, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32 <sup>2</sup>
	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>
<b>NORTH AMERICA</b>						
Canada	11,782	31,908	36,735	39,432	53,764	53,000
United States	655,000	984,600	1,141,000	1,004,000	1,298,600	1,201,000
Total	666,782	1,016,508	1,177,735	1,133,432	1,352,364	1,254,000
<b>EUROPE</b>						
England and Wales	3,084	24,385	240,851	362,757	526,062	325,000
Scotland	( <sup>3</sup> )	( <sup>3</sup> )	1,836	713	1,758	
Irish Free State	( <sup>3</sup> )	( <sup>3</sup> )	24,295	25,557	23,390	8,800
Sweden	153,739	175,564	177,415	133,823	205,767	158,000
Denmark	127,091	142,726	179,014	140,874	175,656	138,000
Netherlands	246,341	324,273	346,849	286,170	317,958	193,000
Belgium	278,837	346,094	308,213	273,426	306,894	300,085
France	807,887	624,498	999,249	1,010,848	1,324,308	980,000
Spain	115,727	199,414	237,476	246,426	318,449	320,000
Italy	208,675	308,261	432,908	496,135	474,904	469,910
Switzerland	3,784	6,698	7,738	6,760	6,300	7,000
Germany	2,340,268	1,557,556	2,054,218	2,187,795	2,808,076	1,692,328
Austria	79,528	53,192	113,800	132,709	165,620	176,000
Czechoslovakia	1,221,274	1,178,534	1,164,525	1,141,638	1,258,014	874,021
Hungary	175,783	139,801	242,579	272,083	258,127	171,000
Yugoslavia	41,459	63,482	140,800	143,769	113,198	82,104
Bulgaria	4,376	22,044	30,071	40,800	80,205	24,000
Rumania	88,245	76,698	160,744	118,150	181,009	70,000
Poland	702,626	421,338	823,714	1,009,597	854,957	644,288
Latvia	( <sup>3</sup> )	( <sup>3</sup> )	1,797	3,888	8,322	10,747
Finland	( <sup>3</sup> )	1,407	3,815	2,780	4,267	4,400
Russia, European	1,557,114	474,700	1,413,000	907,000	1,914,364	2,012,000
Turkey	( <sup>3</sup> )	( <sup>3</sup> )	4,079	6,046	10,700	15,000
Total	8,155,838	6,140,665	9,107,786	8,949,751	11,318,905	8,689,203
<b>ASIA</b>						
Japan:						
Hokkaido	( <sup>3</sup> )	9,995	22,724	28,064	32,334	30,000
Chosen	( <sup>3</sup> )	625	709	733	1,007	1,000
Total		10,620	23,433	28,797	33,341	31,000
<b>OCEANIA</b>						
Australia	1,030	3,021	2,348	3,186	3,752	2,200
World total, beet sugar <sup>7</sup>	8,828,650	7,170,814	10,311,302	10,115,166	12,708,362	9,976,403

## CANE SUGAR (RAW)

NORTH AMERICA, CENTRAL AMERICA, AND WEST INDIES						
United States	302,150	203,224	132,053	199,609	183,693	155,925
Hawaii	567,495	675,249	899,101	912,357	* 915,000	* 915,300
Porto Rico	361,974	499,751	586,761	866,110	783,163	948,942
Virgin Islands	5,482	5,535	2,875	6,424	2,000	* 2,200
Central America:						
Guatemala	8,998	21,733	33,402	* 37,408	* 40,249	* 36,000
Nicaragua	3,742	14,457	* 10,000	15,000		
Salvador	10,834	21,200	23,148	27,600		
Mexico	163,388	179,180	201,831	* 225,000	289,591	* 224,000
West Indies (British):						
Antigua	12,919	13,340	* 12,258	* 20,776	* 9,000	* 16,000
Barbados	27,788	56,200	73,378	55,498	* 38,192	* 66,000
Jamaica	23,896	39,883	64,549	75,313	62,272	* 50,000
St. Christopher	13,252	13,985	15,371	19,763	16,766	* 17,000
Trinidad and Tobago	51,275	66,453	100,717	89,480	* 110,402	* 101,000

<sup>1</sup> Averages are for a 5-year period wherever available, otherwise for any year or years within this period.  
<sup>2</sup> Figures for Europe are estimates of production in territory within present boundaries.

<sup>3</sup> Preliminary.

<sup>4</sup> Unofficial estimate.

<sup>5</sup> No sugar produced.

<sup>6</sup> Too small to report.

<sup>7</sup> Included with cane-sugar production in Japan.

<sup>8</sup> Exclusive of production in minor producing countries for which no statistics are available.

**TABLE 156.—Sugar: Production in specified countries, average 1909-10 to 1913-14 and 1921-22 to 1925-26, and annual 1928-29 to 1931-32—Continued**

## CANE SUGAR (RAW)—Continued

Country	Average, 1909-10 to 1913-14	Average, 1921-22 to 1925-26	1928-29	1929-30	1930-31	1931-32
<b>NORTH AMERICA, CENTRAL AMERICA, AND WEST INDIES—continued</b>						
Cuba.....	Short tons 2, 257, 052	Short tons 4, 908, 638	Short tons 5, 775, 179	Short tons 5, 231, 490	Short tons 3, 495, 292 <sup>a</sup>	Short tons 3, 360, 000
Dominican Republic.....	104, 604	281, 846	396, 575	408, 638	406, 237	424, 850
Haiti.....	( <sup>b</sup> )	10, 158	13, 096	<sup>a</sup> 21, 176	<sup>a</sup> 21, 068	<sup>a</sup> 20, 000
West Indies (French):						
Guadeloupe.....	40, 810	32, 674	<sup>a</sup> 2, 590	<sup>a</sup> 30, 144	<sup>a</sup> 27, 328	<sup>a</sup> 31, 000
Martinique.....	42, 782	33, 573	<sup>a</sup> 42, 056	<sup>a</sup> 42, 038	<sup>a</sup> 41, 328	<sup>a</sup> 44, 000
Total North American and Central American countries and West In- dies reporting, all years.....	4, 013, 885	7, 041, 422	8, 352, 692	8, 247, 164	6, 441, 581	6, 418, 217
<b>EUROPE AND ASIA</b>						
Spain.....	17, 059	8, 738	14, 949	21, 007	27, 800	31, 400
India <sup>c</sup> .....	2, 649, 480	3, 247, 800	3, 035, 000	3, 092, 000	3, 559, 000 <sup>a</sup>	3, 472, 000
Formosa.....	192, 299	471, 748	870, 077	893, 398	867, 561	996, 579
Japan.....	75, 718	91, 569	110, 532	106, 988	161, 723	<sup>a</sup> 206, 102
Java <sup>d</sup> .....	1, 512, 569	2, 113, 004	3, 197, 927	3, 245, 288 <sup>a</sup>	3, 184, 000	2, 688, 000
Philippine Islands.....	294, 380	584, 895	923, 954	983, 767	983, 000	-----
Total European and Asiatic coun- tries reporting, all years.....	4, 447, 125	5, 932, 859	7, 228, 485	7, 358, 677	7, 800, 084	7, 394, 081
<b>SOUTH AMERICA</b>						
Argentina.....	193, 853	288, 008	412, 947	375, 310	420, 854	381, 124
Brazil.....	332, 813	904, 456	1, 066, 301	1, 124, 371	1, 065, 000 <sup>a</sup>	<sup>a</sup> 1, 092, 000
British Guiana.....	112, 297	112, 297	130, 462	131, 324	143, 096	<sup>a</sup> 123, 000
Dutch Guiana.....	13, 235	12, 460	19, 883	14, 099	<sup>a</sup> 18, 500	<sup>a</sup> 16, 000
Ecuador.....	6, 289	17, 603	<sup>a</sup> 25, 370	<sup>a</sup> 21, 008	23, 208	<sup>a</sup> 22, 400
Peru.....	202, 518	354, 567	398, 741	472, 176	<sup>a</sup> 543, 286	<sup>a</sup> 576, 000
Venezuela.....	3, 187	21, 423	<sup>a</sup> 22, 000	<sup>a</sup> 25, 000	<sup>a</sup> 22, 000	<sup>a</sup> 20, 000
Total South America.....	804, 192	1, 710, 823	2, 075, 704	2, 163, 258	2, 178, 944	2, 230, 524
<b>AFRICA</b>						
Egypt.....	67, 127	100, 294	122, 026	118, 157	134, 260	<sup>a</sup> 106, 000
Mauritius.....	233, 671	243, 069	279, 360	262, 386	243, 564	<sup>a</sup> 196, 000
Union of South Africa.....	88, 165	182, 420	295, 984	298, 635	393, 000	329, 400
Portuguese East Africa.....	26, 490	53, 219	100, 786	104, 718	<sup>a</sup> 95, 000	<sup>a</sup> 95, 000
Reunion.....	41, 053	52, 018	42, 211	55, 249	55, 572	<sup>a</sup> 39, 000
Madagascar.....	( <sup>b</sup> )	2, 168	<sup>a</sup> 4, 594	5, 534	6, 724	8, 730
Total Africa.....	457, 076	633, 155	845, 211	845, 673	928, 120	775, 136
<b>OCEANIA</b>						
Australia.....	216, 331	411, 638	602, 083	602, 654	600, 992	<sup>a</sup> 610, 000
Fiji.....	84, 629	71, 984	<sup>a</sup> 110, 525	98, 236	104, 000	<sup>a</sup> 80, 000
Total Oceania.....	300, 960	483, 622	712, 608	700, 890	704, 992	739, 000
Total cane-sugar producing countries reporting all years.....	10, 063, 238	15, 801, 881	19, 214, 700	19, 315, 662	18, 053, 721	17, 555, 958
Estimated world total cane sugar <sup>e</sup> .....	10, 539, 000	16, 610, 000	20, 365, 000	20, 527, 000	19, 253, 000	18, 759, 000
Total world cane and beet sugar pro- duction in countries reporting all years.....	18, 906, 888	22, 972, 695	29, 526, 002	29, 430, 828	30, 762, 063	27, 533, 361
Estimated world total cane and beet sugar <sup>f</sup> .....	19, 363, 000	23, 781, 000	30, 676, 000	30, 642, 000	31, 961, 000	28, 735, 000

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture except as otherwise stated. Figures are for the crop years 1909-10 to 1931-32 for the countries in which the sugar-harvesting season begins in the fall months and is completed during the following calendar year, except in certain cane-sugar producing countries in the Southern Hemisphere, such as Argentina, Australia, Mauritius, Union of South Africa, etc., where the season begins in May or June and is completed in the same calendar year. Production in these countries is for the calendar years 1909 to 1931.

<sup>a</sup> Unofficial estimate.

<sup>b</sup> No sugar produced.

<sup>c</sup> Too small to report.

<sup>d</sup> Exclusive of production in minor producing countries for which no statistics are available.

<sup>e</sup> The figures quoted for India are for the production of gur, a low grade of sugar polarizing between 50° and 60°. Practically the entire crop is consumed within the country.

<sup>f</sup> All grades of sugar reduced to terms of head sugar, a grade of sugar which contains at least 96.5 per cent of sucrose. Figures for Java are for the calendar years 1910 to 1932.

TABLE 157.—*Sugar: Production, trade, and supply available for consumption in continental United States, 1909-10 to 1931-32*

## IN TERMS OF RAW SUGAR

Year beginning July	Production <sup>1</sup>	Brought in from insular possessions <sup>2</sup>	Imports as sugar <sup>3</sup>	Domestic exports as sugar <sup>4</sup>	Exports in other forms <sup>5</sup>	Available for consumption <sup>6</sup>	
						Total	Per capita
	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Pounds
1909-10.....	882,630	927,752	1,934,754	72,382	24,351	3,648,403	79.7
1910-11.....	903,475	943,701	1,845,279	36,597	15,966	3,639,991	78.3
1911-12.....	1,005,337	1,187,663	1,832,424	50,380	15,160	3,959,883	83.9
1912-13.....	907,070	1,026,972	2,266,426	30,963	19,217	4,150,288	86.6
1913-14.....	1,088,944	936,376	2,462,252	37,190	11,892	4,439,489	91.3
1914-15.....	1,022,828	1,068,314	2,529,963	302,641	13,585	4,334,878	87.9
1915-16.....	1,078,407	1,102,057	2,689,067	882,864	12,213	3,974,453	79.4
1916-17.....	1,193,107	1,203,938	2,527,984	676,752	20,211	4,219,066	83.2
1917-18.....	1,068,437	975,684	2,344,816	305,429	46,131	4,037,377	78.5
1918-19.....	1,102,421	1,073,944	2,799,962	568,568	36,747	4,371,013	83.8
1919-20.....	908,060	973,735	3,812,955	776,502	98,386	4,816,882	91.1
1920-21.....	1,346,811	1,076,342	3,228,279	319,589	89,491	5,242,352	97.6
1921-22.....	1,424,728	1,340,867	3,940,777	1,085,349	31,897	5,589,624	102.4
1922-23.....	1,021,360	1,235,049	4,068,205	412,196	12,568	5,899,849	106.5
1923-24.....	1,111,898	1,274,870	3,436,955	182,883	24,617	5,646,223	100.2
1924-25.....	1,260,000	1,645,319	3,931,282	273,470	22,436	6,540,695	114.2
1925-26.....	1,121,000	1,981,482	3,895,947	325,804	24,998	6,647,627	114.4
1926-27.....	1,011,000	1,689,347	3,968,997	124,555	26,303	6,518,488	110.6
1927-28.....	1,246,000	2,051,659	3,415,830	115,566	29,833	6,508,090	110.1
1928-29.....	1,273,000	1,974,899	4,115,601	139,324	31,894	7,192,282	119.0
1929-30.....	1,294,000	2,377,787	2,823,173	87,092	43,320	6,364,548	103.3
1930-31.....	1,482,000	2,603,733	2,416,400	77,131	33,026	6,391,976	103.0
1931-32.....	1,357,000						

IN TERMS OF REFINED SUGAR<sup>7</sup>

1921-22.....	1,325,906	1,260,894	3,686,397	1,009,377	29,182	5,234,638	95.9
1922-23.....	950,625	1,166,351	3,805,745	383,439	11,682	5,522,600	99.7
1923-24.....	1,034,615	1,198,777	3,214,883	142,217	22,943	5,283,115	93.7
1924-25.....	1,172,000	1,547,587	3,674,563	254,391	20,911	6,118,848	106.8
1925-26.....	1,043,000	1,859,332	3,634,323	303,073	23,298	6,210,284	106.8
1926-27.....	941,000	1,588,981	3,714,054	115,865	24,514	6,103,656	103.6
1927-28.....	1,159,000	1,930,732	3,196,443	107,704	27,805	6,150,666	103.1
1928-29.....	1,184,000	1,858,331	3,851,311	129,846	29,726	6,734,070	111.4
1929-30.....	1,204,000	2,239,140	2,641,709	81,187	40,375	5,963,307	96.8
1930-31.....	1,379,000	2,451,609	2,261,189	71,884	30,781	5,989,133	96.5
1931-32.....	1,262,000						

Bureau of Agricultural Economics. Trade figures from the Bureau of Foreign and Domestic Commerce.

<sup>1</sup> Beet and cane sugar only.<sup>2</sup> Duty free, from Hawaii, Porto Rico, and the Philippine Islands (Virgin Islands included 1917 and subsequently).<sup>3</sup> No account taken of sugar imported in other forms. Imports from the Philippine Islands excluded, reexports deducted.<sup>4</sup> Shipments to Hawaii and Porto Rico included. Direct exports to foreign countries from Hawaii and Porto Rico excluded.<sup>5</sup> Sugar used in the manufacture of other commodities for export on which drawback was paid.<sup>6</sup> No account taken of stocks at the beginning or end of year.<sup>7</sup> Raw sugar converted to refined by multiplying by the following factors: Cuba and Hawaii, 0.9358; Porto Rico, 0.9393; Philippines, 0.95; all others (Santo Domingo, British West Indies, Louisiana, etc.), 0.932.

TABLE 158.—*Sugar, raw, cane and beet: World production, 1909-10 to 1931-32*

Crop year <sup>1</sup>	Estimated world total	Estimated world total cane sugar	Estimated world total beet sugar	Production in selected countries							
				United States <sup>2</sup>	Cuba	India <sup>3</sup>	Java <sup>4</sup>	Germany <sup>5</sup>	Czechoslovakia	Poland <sup>6</sup>	France <sup>7</sup>
	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons
1909-10-----	16,828	9,870	7,158	1,000	2,021	2,481	1,411	2,147			861
1910-11-----	18,824	9,870	8,064	903	1,661	2,567	1,617	2,770			763
1911-12-----	17,908	10,822	7,286	1,005	2,724	2,745	1,550	1,552			546
1912-13-----	20,542	10,896	9,646	907	2,720	2,882	1,616	2,902			1,029
1913-14-----	21,154	11,640	9,514	1,089	2,908	2,573	1,549	2,886			841
1914-15-----	20,875	11,952	8,923	1,023	2,922	2,736	1,454	2,721			855
1915-16-----	18,885	12,278	6,607	1,078	3,368	2,049	1,797	1,673		376	199
1916-17-----	18,592	13,255	5,337	1,193	3,422	3,093	2,009	1,721		239	159
1917-18-----	20,293	14,790	5,503	1,068	3,890	3,839	1,980	1,726		293	217
1918-19-----	18,604	14,076	4,528	1,102	4,491	2,752	1,473	1,597	714	268	235
1919-20-----	17,989	14,338	3,651	903	4,184	3,404	1,681	774	553	249	129
1920-21-----	19,546	14,225	5,321	1,347	4,408	2,825	1,853	1,195	797	195	182
1921-22-----	20,578	15,095	5,483	1,425	4,517	2,928	1,994	1,434	731	170	358
1922-23-----	20,860	16,127	5,733	1,022	4,083	3,410	1,981	1,604	811	335	322
1923-24-----	22,810	16,306	6,504	1,112	4,606	3,715	2,201	1,263	1,115	423	524
1924-25-----	26,070	17,712	8,968	1,260	5,812	2,852	2,535	1,724	1,574	540	919
1925-26-----	27,989	18,813	9,176	1,120	5,524	3,334	2,175	1,763	1,662	638	831
1926-27-----	26,624	18,125	8,499	1,011	5,050	3,659	2,639	1,834	1,153	634	786
1927-28-----	28,515	18,671	9,844	1,246	4,527	3,603	3,238	1,840	1,363	658	956
1928-29-----	30,676	20,365	10,311	1,273	5,775	3,035	3,198	2,054	1,165	824	999
1929-30-----	30,642	20,527	10,115	1,294	5,231	3,092	3,245	2,188	1,142	1,010	1,011
1930-31 <sup>8</sup> -----	31,961	19,253	12,708	1,482	3,495	3,559	3,184	2,808	1,259	855	1,324
1931-32 <sup>9</sup> -----	28,735	18,759	9,976	1,357	3,360	3,472	2,688	1,692	874	644	980

Bureau of Agricultural Economics. Estimated world total sugar production for the period 1895-96 to 1908-09 in *Agricultural Yearbook*, 1924, p. 308.

<sup>1</sup> Figures are for the crop years 1909-10 to 1930-31 for the countries in which the sugar production season begins in the fall months and is completed during the following calendar year, except in certain cane-sugar producing countries where the season begins in May or June and is completed in the same calendar year. Production in these countries is for the calendar years 1909 to 1930.

<sup>2</sup> Production of cane and beet sugar in terms of raw sugar.

<sup>3</sup> The figures quoted for India are for the production of gur, a low grade of sugar polarizing between 80° and 86°. Practically the entire crop is consumed within the country.

<sup>4</sup> All grades of sugar reduced to terms of head sugar, a grade of sugar which contains at least 96.5 per cent sucrose. Figures for Java are for the calendar years 1910-1932.

<sup>5</sup> Figures for 1909-10 to 1917-18 are for pre-war boundaries.

<sup>6</sup> Figures are incomplete through 1920-21; 1914-15 includes Prussian Poland only; 1915-16 to 1919-20 include Prussian Poland and Congress Poland; 1920-21 includes Prussian Poland, Congress Poland, and Galicia.

<sup>7</sup> Figures for 1909-10 to 1918-19 refer to pre-war boundaries; 1914-15 to 1918-19 are exclusively of invaded territory.

<sup>8</sup> Bohemia, Moravia, and Silesia only.

<sup>9</sup> Preliminary.

<sup>10</sup> Unofficial estimate.

TABLE 159.—*Sugar, raw (96° centrifugal): Average wholesale price per pound, New York, 1922-1931<sup>1</sup>*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average <sup>2</sup>
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1922-----	3.6	3.8	3.9	4.0	4.1	4.6	5.2	5.2	4.8	5.4	5.6	5.7	4.7
1923-----	5.3	6.2	7.3	7.8	7.9	7.4	6.9	6.1	7.0	7.6	7.3	7.3	7.0
1924-----	6.7	7.2	6.9	6.4	5.6	5.1	5.1	5.4	6.0	6.0	5.8	5.3	6.0
1925-----	4.6	4.6	4.7	4.5	4.3	4.4	4.3	4.4	4.3	3.9	4.0	4.1	4.3
1926-----	4.2	4.2	4.0	4.1	4.2	4.1	4.2	4.2	4.4	4.6	4.7	5.1	4.8
1927-----	5.1	4.9	4.8	4.8	4.8	4.6	4.5	4.5	4.8	4.7	4.7	4.6	4.7
1928-----	4.5	4.3	4.5	4.5	4.5	4.3	4.2	4.1	4.2	3.9	3.9	3.9	4.2
1929-----	3.8	3.7	3.7	3.7	3.6	3.5	3.8	3.8	4.0	4.0	3.8	3.8	3.8
1930-----	3.7	3.7	3.6	3.5	3.2	3.2	3.3	3.2	3.1	3.3	3.4	3.3	3.4
1931-----	3.4	3.3	3.3	3.3	3.2	3.3	3.5	3.5	3.4	3.4	3.4	3.2	3.3

Bureau of Agricultural Economics. Compiled from Bureau of Labor Statistics reports. Data for 1890-1921 are available in 1924 *Yearbook*, p. 810, Table 388.

<sup>1</sup> Quotations are on basis of duty paid.

<sup>2</sup> Derived from the figures upon which the monthly averages are based.

TABLE 160.—*Sugar: International trade, average 1925-1929, annual 1927-1930*

Country	Calendar year							
	Average, 1925-1929		1928		1929		1930 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
<b>PRINCIPAL EXPORTING COUNTRIES</b>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>
Cuba.....	5,048,092	525	4,389,253	135	5,543,887	793	5,642,624	87
Dutch East Indies.....	2,880,762	3,634	2,827,302	3,772	2,680,686	3,826	2,403,929	3,335
Czechoslovakia.....	792,566	628	819,545	77	595,086	109	571,862	3,332
Philippine Islands.....	612,260	2,398	628,242	4,887	767,055	2,138	820,089	1,046
Dominican Republic.....	353,915	186	353,681	17	355,574	7	356,621	6
Peru.....	332,668	106	337,270	24	400,553	107	435,378	373,441
Poland.....	253,202	2,291	264,675	38	328,309	11,087	373,441	11,977
Mauritius.....	242,139	3	241,695	3	306,259	2	306,259	2
Australia.....	179,533	911	232,667	33	216,394	27	216,394	27
Germany.....	174,357	92,758	85,161	138,113	242,455	30,828	328,458	18,876
Belgium.....	152,463	77,894	109,906	86,349	128,508	38,820	79,012	74,767
British Guiana.....	113,607	447	128,449	536	112,508	361	128,287	192
Russia.....	105,624	57,858	150,348	2	139,719	40,086	342,155	193
Fiji.....	92,836	171	135,165	172	80,948	290	101,896	722
Hungary.....	90,488	417	78,013	594	133,851	362	117,780	193
Union of South Africa.....	82,951	10,307	90,389	17,977	122,740	19,867	183,482	10,126
Trinidad and Tobago.....	72,520	1,564	83,006	2,056	91,284	1,007	77,435	1,010
Barbados.....	61,494	0	70,178	0	73,379	0	56,497	0
Reunion.....	54,035	26	39,516	132	41,447	0	41,447	0
Jamaica.....	49,678	1,081	54,562	1,102	41,866	1,373	41,866	1,373
Mozambique.....	37,906	93	40,060	377	55,299	14	55,299	14
Brazil.....	25,076	20	33,116	3	16,400	0	93,097	4
Argentina.....	23,426	17,264	37,775	1,246	10,034	1,979	4,699	5,083
Madagascar.....	3,897	3,768	4,659	3,960	5,500	4,237	4,784	3,618
<b>Total.....</b>	<b>11,334,953</b>	<b>274,360</b>	<b>11,204,616</b>	<b>261,605</b>	<b>12,490,337</b>	<b>207,708</b>	<b>9,501,030</b>	<b>846,950</b>
<b>PRINCIPAL IMPORTING COUNTRIES</b>								
United States.....	167,360	4,428,566	122,587	3,868,804	102,639	4,888,389	77,814	3,495,113
United Kingdom.....	105,263	2,146,493	83,825	2,150,189	186,786	2,351,404	312,589	2,136,360
British India.....	40,084	904,568	44,761	930,251	42,962	1,034,939	48,487	1,014,270
China.....	2,072	823,225	1,542	916,132	665	959,428	252	812,404
Canada.....	89,514	624,446	27,555	477,711	20,799	475,490	13,606	472,706
France.....	261,691	460,753	282,929	458,067	381,458	562,430	308,767	452,644
Japan.....	204,609	414,134	258,084	423,396	217,615	251,020	244,568	269,693
Netherlands.....	284,204	316,951	227,232	307,109	122,542	188,931	106,270	198,641
Switzerland.....	74	148,736	85	158,532	97	168,479	158	166,365
Chile.....	133	136,205	200	149,113	159	168,151	125,935	125,935
British Malaya.....	31,068	125,180	32,135	125,178	21,297	128,229	15,585	125,473
Morocco.....	0	121,576	0	128,314	0	146,913	0	142,492
Austria.....	663	114,983	617	118,737	55	158,766	558	89,632
Sweden.....	18	110,608	18	103,528	385	158,766	90	91,037
Irish Free State.....	0	92,080	0	90,115	0	88,518	0	92,108
Finland.....	0	87,238	0	101,485	0	101,349	0	134,417
Portugal.....	102	86,255	105	94,066	80	78,784	0	78,784
Persia.....	99	82,505	9	84,399	8	100,175	0	100,175
New Zealand.....	739	81,102	867	89,497	1,062	78,665	1,222	96,579
Norway.....	0	79,493	0	80,109	0	83,705	0	93,011
Egypt.....	9,341	79,282	5,704	77,881	7,256	107,974	5,146	143,326
Italy.....	6,610	68,519	4	113,438	9,192	23,499	14,361	20,700
Greece.....	12	64,751	23	67,075	0	69,785	0	70,499
Algeria.....	65	63,358	21	70,785	68	75,502	0	81,268
Ceylon.....	1	61,046	0	69,080	1	72,242	0	80,102
Siam.....	1,648	46,472	243	44,164	39	49,447	0	52,873
Latvia.....	0	41,655	0	46,559	70	45,689	0	45,874
Uruguay.....	0	41,575	0	37,338	0	41,103	0	41,103
Denmark.....	3,148	29,841	605	43,603	626	42,862	183	50,315
Tunisia.....	0	29,742	0	31,841	0	37,478	0	41,384
Lithuania.....	9	25,731	26	27,501	18	29,796	0	34,418
Anglo-Egyptian Sudan.....	0	23,812	0	26,766	0	32,970	0	34,442
Formosa.....	13,346	18,109	8,744	8,374	2,967	1,042	0	0
Yugoslavia.....	4,654	7,320	0	16,108	14,656	3,102	8,858	2,072
Gold Coast.....	0	5,584	0	6,704	0	5,994	0	0
<b>Total.....</b>	<b>1,216,853</b>	<b>11,891,894</b>	<b>1,097,921</b>	<b>11,578,806</b>	<b>1,083,781</b>	<b>12,771,043</b>	<b>1,158,844</b>	<b>10,670,106</b>

Bureau of Agricultural Economics. Official sources except where otherwise noted. The following kinds and grades have been included under the head of sugar: Brown, white, candied, caramel, chancaca (Peru), crystal cube, maple, muscovado, panels. The following have been excluded: "Candy" (meaning confectionery), confectionery, glucose, grape sugar, jaggery, molasses, and sirups.

<sup>1</sup> Preliminary.

<sup>2</sup> Java and Madura only.

<sup>3</sup> International Yearbook of Agricultural Statistics.

<sup>4</sup> Year ended Mar. 20 of following year.

<sup>5</sup> 2-year average.

<sup>6</sup> Year ended Mar. 31 of following year.

TABLE 161.—*Sugar, granulated: Average retail price per pound, United States, 1922-1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1922.....	6.2	6.4	6.5	6.7	6.6	7.1	7.6	8.1	7.9	7.9	8.1	8.3	7.3
1923.....	8.3	8.7	10.2	10.6	11.2	11.1	10.5	9.6	9.6	10.6	10.3	10.4	10.1
1924.....	10.2	10.3	10.4	9.9	9.2	8.3	8.4	8.2	8.6	8.8	8.8	8.8	9.2
1925.....	8.1	7.7	7.7	7.5	7.2	7.2	7.1	7.0	7.0	6.8	6.6	6.7	7.2
1926.....	6.7	6.7	6.7	6.6	6.7	6.9	6.9	7.0	7.0	7.1	7.1	7.3	6.9
1927.....	7.5	7.5	7.4	7.3	7.3	7.3	7.4	7.3	7.2	7.2	7.2	7.1	7.3
1928.....	7.1	7.1	7.1	7.1	7.2	7.3	7.3	7.1	7.0	6.9	6.8	6.7	7.1
1929.....	6.7	6.6	6.5	6.4	6.4	6.4	6.4	6.6	6.7	6.7	6.7	6.6	6.6
1930.....	6.6	6.5	6.4	6.3	6.3	6.1	6.1	5.9	5.8	5.8	5.9	5.9	6.2
1931.....	5.9	5.9	5.8	5.7	5.6	5.6	5.6	5.7	5.7	5.6	5.6	5.5	5.7

Bureau of Agricultural Economics. Compiled from Bureau of Labor Statistics retail prices. Data for 1913-1921 available in 1930 Yearbook, p. 704, Table 162.

TABLE 162.—*Sorgo sirup: Acreage, production, and December 1 price, by States, 1928-1931*

State	Acreage used for sirup				Average yield per acre				Production				Price per gallon received by producers			
	1928	1929	1930	1931 <sup>1</sup>	1928	1929	1930	1931	1928	1929	1930	1931 <sup>1</sup>	1928	1929	1930	1931
	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>Gals.</i>	<i>Gals.</i>	<i>Gals.</i>	<i>Gals.</i>	<i>1,000 gals.</i>	<i>1,000 gals.</i>	<i>1,000 gals.</i>	<i>1,000 gals.</i>	<i>Cts.</i>	<i>Cts.</i>	<i>Cts.</i>	<i>Cts.</i>
Indiana.....	2	2	2	3	96	60	47	65	192	132	94	195	115	110	110	60
Illinois.....	9	2	2	2	72	65	51	72	648	130	102	144	110	110	110	67
Iowa.....	3	3	2	3	120	111	100	90	360	333	200	270	115	115	115	87
Missouri.....	22	9	10	12	85	55	45	55	1,870	495	450	680	100	105	100	62
Kansas.....	2	1	2	4	75	60	40	50	150	60	80	200	100	95	100	71
Virginia.....	12	2	2	3	86	61	40	70	1,032	122	80	210	95	95	95	67
North Carolina.....	20	15	22	20	86	70	60	73	1,720	1,050	1,320	2,117	90	85	80	53
South Carolina.....	18	5	7	9	72	52	50	54	1,296	200	350	486	80	75	48	
Georgia.....	24	11	12	16	80	65	62	61	1,920	715	744	978	90	90	70	43
Kentucky.....	42	12	12	18	72	55	40	70	3,024	600	480	1,260	95	100	90	49
Tennessee.....	29	19	18	28	78	60	48	65	2,262	1,140	864	1,820	95	95	90	40
Alabama.....	30	22	31	54	75	63	65	75	2,250	1,386	2,015	4,080	90	75	70	32
Mississippi.....	30	17	14	25	80	81	68	88	2,400	1,877	952	2,200	80	75	60	30
Arkansas.....	40	12	12	20	70	46	38	70	2,800	552	456	1,400	90	95	85	40
Oklahoma.....	15	4	1	10	70	36	25	48	1,050	144	25	450	85	85	85	45
Texas.....	32	14	16	23	83	50	44	60	2,656	700	704	1,380	80	85	73	49
United States.....	330	150	165	259	77.7	61.7	54.0	63.8	25,630	9,256	8,916	17,818	90.4	89.7	78.7	43.0

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.

TABLE 163.—*Sugarcane sirup: Acreage, production, and December 1 price, by States, 1928-1931*

State	Acreage used for sirup				Average yield per acre				Production				Price per gallon received by producers			
	1928	1929	1930	1931 <sup>1</sup>	1928	1929	1930	1931	1928	1929	1930	1931 <sup>1</sup>	1928	1929	1930	1931
	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>Gals.</i>	<i>Gals.</i>	<i>Gals.</i>	<i>Gals.</i>	<i>1,000 gals.</i>	<i>1,000 gals.</i>	<i>1,000 gals.</i>	<i>1,000 gals.</i>	<i>Cts.</i>	<i>Cts.</i>	<i>Cts.</i>	<i>Cts.</i>
South Carolina.....	6	5	5	5	125	118	118	80	750	590	590	400	90	90	80	60
Georgia.....	29	29	28	28	140	165	130	100	4,080	4,785	3,640	2,800	75	75	60	50
Florida.....	8	10	9	9	180	188	170	165	1,440	1,860	1,530	1,485	85	85	65	50
Alabama.....	16	18	18	20	117	117	120	93	1,872	2,106	2,160	1,800	95	90	80	55
Mississippi.....	18	17	16	14	200	191	120	150	3,600	3,247	1,800	2,100	90	85	70	55
Arkansas.....	2	1	1	1	120	106	54	140	240	106	54	140	110	110	100	69
Louisiana.....	20	17	22	20	334	340	282	252	6,679	5,773	6,208	5,045	55	48	38	39
Texas.....	11	7	6	7	160	124	142	147	1,700	868	852	1,020	110	105	95	70
United States.....	110	104	104	104	185.5	185.9	161.9	142.9	20,401	19,335	16,834	14,850	77.6	72.7	57.7	49.3

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.

TABLE 164.—Maple sugar and sirup: Production in important States, 1917-1931<sup>1</sup>

Year	Trees tapped	Sugar made	Sirup made	Total product in terms of sugar <sup>2</sup>	Average total product per tree		Average price received by producers	
					As sugar <sup>2</sup>	As sirup <sup>2</sup>	Per pound of sugar	Per gallon of sirup
	1,000 trees	1,000 pounds	1,000 gallons	1,000 pounds	Pounds	Gallons	Cents	Dollars
1917.....	17,313	10,525	4,253	44,589	2.58	0.32	.....	.....
1918.....	19,132	12,944	4,863	51,848	2.71	.34	.....	.....
1919.....	18,799	9,787	3,804	40,219	2.14	.27	.....	.....
1920.....	18,895	7,324	3,580	35,904	1.90	.24	.....	.....
1921.....	15,114	4,730	2,386	23,818	1.58	.20	.....	.....
1922.....	16,274	5,147	3,640	34,267	2.11	.26	.....	.....
1923.....	15,291	4,685	3,605	33,525	2.19	.27	.....	.....
1924.....	15,407	4,078	3,903	35,302	2.29	.29	0.26	2.02
1925.....	15,313	3,236	3,089	27,946	1.82	.23	.27	2.10
1926.....	14,712	3,589	3,737	33,465	2.27	.28	.29	2.16
1927.....	14,603	3,133	3,071	32,501	2.23	.28	.29	2.09
1928.....	14,388	2,317	3,007	26,373	1.83	.23	.29	2.05
1929.....	12,906	1,344	2,346	20,112	1.56	.19	.30	2.03
1930.....	13,113	2,430	3,635	31,510	2.40	.30	.30	2.02
1931 <sup>2</sup> .....	12,218	1,053	2,157	18,909	1.55	.19	.26	1.72

Bureau of Agricultural Economics.

<sup>1</sup> The data for 1917-1923 include 11 States: Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New York, Pennsylvania, Ohio, Indiana, Michigan, and Wisconsin; data for 10 States, excluding Connecticut, are shown for 1924 and 1925; and data from 9 States, excluding Indiana, are shown from 1926 to 1931. In 1919 the 9 States now included produced about 97 per cent of the maple sugar and about 92 per cent of the maple sirup, as reported by the Bureau of the Census.

<sup>2</sup> 1 gallon of sirup taken as equivalent to 8 pounds of sugar.

<sup>3</sup> Preliminary.

TABLE 165.—Maple sugar and sirup: Production by States, 1928-1931

State	Trees tapped				Sugar made				Sirup made			
	1928	1929	1930	1931 <sup>1</sup>	1928	1929	1930	1931 <sup>1</sup>	1928	1929	1930	1931 <sup>1</sup>
	1,000 trees	1,000 trees	1,000 trees	1,000 trees	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 gallons	1,000 gallons	1,000 gallons	1,000 gallons
Maine.....	304	255	255	255	3	24	40	9	38	40	38	26
New Hampshire.....	806	378	382	390	274	109	154	78	137	88	93	56
Vermont.....	5,722	5,535	5,646	5,194	1,133	690	1,195	830	1,038	1,090	1,368	578
Massachusetts.....	280	208	268	252	134	37	110	34	67	44	80	43
New York.....	3,647	3,613	3,082	3,229	549	298	613	324	718	613	1,120	577
Pennsylvania.....	607	913	905	848	67	105	212	190	157	133	350	202
Ohio.....	1,583	1,208	1,214	1,256	58	39	55	96	480	205	368	440
Michigan.....	369	493	503	508	70	34	39	73	208	79	146	156
Wisconsin.....	570	243	258	286	29	8	12	10	164	54	72	79
9 States.....	14,388	12,906	13,113	12,218	2,317	1,344	2,430	1,653	3,007	2,346	3,635	2,157

Bureau of Agricultural Economics.

<sup>1</sup> Preliminary.

TABLE 166.—Honey: Monthly average price in producing sections and at consuming markets, 1921-1930

## EXTRACTED HONEY, PER POUND

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
CALIFORNIA WHITE TO WATER WHITE ORANGE												
F. o. b. southern California shipping points: <sup>1</sup>	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1927.....	7 <sup>3</sup> / <sub>4</sub>	9	8 <sup>3</sup> / <sub>4</sub>	8	8 <sup>3</sup> / <sub>4</sub>	8 <sup>3</sup> / <sub>4</sub>	9	9	9 <sup>1</sup> / <sub>2</sub>	9 <sup>1</sup> / <sub>2</sub>	9 <sup>1</sup> / <sub>2</sub>	10
1928.....	10	10	10	9 <sup>1</sup> / <sub>2</sub>	8 <sup>3</sup> / <sub>4</sub>	8 <sup>3</sup> / <sub>4</sub>	9	9 <sup>1</sup> / <sub>2</sub>	9 <sup>1</sup> / <sub>2</sub>	9 <sup>1</sup> / <sub>2</sub>	9 <sup>1</sup> / <sub>2</sub>	9 <sup>1</sup> / <sub>2</sub>
1929.....	9 <sup>1</sup> / <sub>2</sub>	9 <sup>1</sup> / <sub>2</sub>	9 <sup>1</sup> / <sub>2</sub>	9 <sup>1</sup> / <sub>2</sub>	10	10 <sup>1</sup> / <sub>2</sub>	11	11 <sup>1</sup> / <sub>2</sub>	11	11	12	-----
1930.....	12 <sup>3</sup> / <sub>4</sub>	12 <sup>3</sup> / <sub>4</sub>	13 <sup>1</sup> / <sub>2</sub>	10 <sup>1</sup> / <sub>2</sub>	8 <sup>3</sup> / <sub>4</sub>	8	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>3</sup> / <sub>4</sub>
1931.....	7 <sup>3</sup> / <sub>4</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	6 <sup>1</sup> / <sub>2</sub>	6 <sup>1</sup> / <sub>2</sub>	6 <sup>3</sup> / <sub>4</sub>	6 <sup>1</sup> / <sub>2</sub>	6 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>
New York City: <sup>2</sup>												
1927.....	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	11	-----	11	11 <sup>1</sup> / <sub>2</sub>	11 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	13	12 <sup>1</sup> / <sub>2</sub>	13	13
1928.....	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	13	12 <sup>1</sup> / <sub>2</sub>	13	12 <sup>1</sup> / <sub>2</sub>
1929.....	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	13	13 <sup>1</sup> / <sub>2</sub>	13 <sup>1</sup> / <sub>2</sub>	13 <sup>1</sup> / <sub>2</sub>
1930.....	13 <sup>1</sup> / <sub>2</sub>	13 <sup>1</sup> / <sub>2</sub>	13 <sup>1</sup> / <sub>2</sub>	13 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12 <sup>1</sup> / <sub>2</sub>	12
1931.....	11 <sup>1</sup> / <sub>2</sub>	11 <sup>1</sup> / <sub>2</sub>	11 <sup>1</sup> / <sub>2</sub>	11	11	10 <sup>1</sup> / <sub>2</sub>	10 <sup>1</sup> / <sub>2</sub>	10 <sup>1</sup> / <sub>2</sub>	11	11	10 <sup>1</sup> / <sub>2</sub>	10 <sup>3</sup> / <sub>4</sub>
INTERMOUNTAIN WHITE TO WATER WHITE SWEET CLOVER AND ALFALFA												
F. o. b. intermountain points: <sup>3</sup>												
1927.....	6 <sup>3</sup> / <sub>4</sub>	6 <sup>1</sup> / <sub>2</sub>	6	5 <sup>1</sup> / <sub>2</sub>	5 <sup>1</sup> / <sub>2</sub>	6	6	6 <sup>3</sup> / <sub>4</sub>	7	7 <sup>1</sup> / <sub>2</sub>	7 <sup>3</sup> / <sub>4</sub>	7 <sup>3</sup> / <sub>4</sub>
1928.....	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7	7 <sup>1</sup> / <sub>2</sub>	7	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7	7
1929.....	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>
1930.....	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7	6 <sup>1</sup> / <sub>2</sub>	6 <sup>1</sup> / <sub>2</sub>	5 <sup>1</sup> / <sub>2</sub>	6 <sup>1</sup> / <sub>2</sub>	6 <sup>1</sup> / <sub>2</sub>	5 <sup>1</sup> / <sub>2</sub>	5 <sup>1</sup> / <sub>2</sub>	5 <sup>1</sup> / <sub>2</sub>	5 <sup>1</sup> / <sub>2</sub>
1931.....	5 <sup>1</sup> / <sub>2</sub>	5 <sup>1</sup> / <sub>2</sub>	5 <sup>1</sup> / <sub>2</sub>	5 <sup>1</sup> / <sub>2</sub>	4 <sup>3</sup> / <sub>4</sub>	4 <sup>3</sup> / <sub>4</sub>	5 <sup>1</sup> / <sub>2</sub>	5 <sup>1</sup> / <sub>2</sub>	5 <sup>1</sup> / <sub>2</sub>	5	5 <sup>1</sup> / <sub>2</sub>	4 <sup>3</sup> / <sub>4</sub>
WHITE CLOVER												
F. o. b. New York and North Central States: <sup>4</sup>												
1927.....	10 <sup>1</sup> / <sub>2</sub>	10	9 <sup>1</sup> / <sub>2</sub>	9 <sup>1</sup> / <sub>2</sub>	9 <sup>1</sup> / <sub>2</sub>	8 <sup>3</sup> / <sub>4</sub>	8 <sup>3</sup> / <sub>4</sub>	9	8 <sup>1</sup> / <sub>2</sub>	8 <sup>1</sup> / <sub>2</sub>	8 <sup>3</sup> / <sub>4</sub>	8 <sup>1</sup> / <sub>2</sub>
1928.....	8 <sup>3</sup> / <sub>4</sub>	8 <sup>1</sup> / <sub>2</sub>	8	8	8	8 <sup>1</sup> / <sub>2</sub>	9 <sup>1</sup> / <sub>2</sub>	9	8 <sup>1</sup> / <sub>2</sub>	8 <sup>1</sup> / <sub>2</sub>	9	8 <sup>1</sup> / <sub>2</sub>
1929.....	8 <sup>3</sup> / <sub>4</sub>	8 <sup>3</sup> / <sub>4</sub>	9	9 <sup>1</sup> / <sub>2</sub>	8 <sup>3</sup> / <sub>4</sub>	9	9 <sup>1</sup> / <sub>2</sub>	8 <sup>3</sup> / <sub>4</sub>	8 <sup>1</sup> / <sub>2</sub>	8 <sup>1</sup> / <sub>2</sub>	8 <sup>1</sup> / <sub>2</sub>	8
1930.....	8 <sup>1</sup> / <sub>2</sub>	8 <sup>1</sup> / <sub>2</sub>	8 <sup>1</sup> / <sub>2</sub>	8 <sup>1</sup> / <sub>2</sub>	8 <sup>1</sup> / <sub>2</sub>	7 <sup>3</sup> / <sub>4</sub>	7 <sup>3</sup> / <sub>4</sub>	8	7 <sup>3</sup> / <sub>4</sub>	7 <sup>3</sup> / <sub>4</sub>	7 <sup>3</sup> / <sub>4</sub>	7 <sup>3</sup> / <sub>4</sub>
1931.....	7 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	6 <sup>1</sup> / <sub>2</sub>	6 <sup>1</sup> / <sub>2</sub>	6 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>	7	6 <sup>3</sup> / <sub>4</sub>	6 <sup>3</sup> / <sub>4</sub>
NORTHEASTERN BUCK-WHEAT												
F. o. b. New York and Pennsylvania points: <sup>4</sup>												
1927.....	8 <sup>1</sup> / <sub>2</sub>	7	7 <sup>3</sup> / <sub>4</sub>	-----	8 <sup>1</sup> / <sub>2</sub>	-----	-----	8	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>3</sup> / <sub>4</sub>
1928.....	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	6 <sup>3</sup> / <sub>4</sub>	-----	-----	-----	8	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>
1929.....	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	-----	8 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>	8	7 <sup>1</sup> / <sub>2</sub>	7 <sup>1</sup> / <sub>2</sub>
1930.....	7 <sup>1</sup> / <sub>2</sub>	6 <sup>1</sup> / <sub>2</sub>	6 <sup>3</sup> / <sub>4</sub>	7 <sup>3</sup> / <sub>4</sub>	-----	7	-----	8	6 <sup>1</sup> / <sub>2</sub>	6 <sup>1</sup> / <sub>2</sub>	5 <sup>1</sup> / <sub>2</sub>	6
1931.....	-----	5 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	5 <sup>3</sup> / <sub>4</sub>	-----	-----	5 <sup>1</sup> / <sub>2</sub>	-----	5	5	5	5

## COMB HONEY, 24-SECTION CASES

WHITE CLOVER COMB, NO. 1 AND FANCY												
F. o. b. New York and North Central States: <sup>4</sup>	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1927.....	4.50	5.25	5.25	5.25	-----	5.00	5.00	4.75	4.25	4.75	4.50	4.80
1928.....	4.50	4.80	4.50	4.80	4.50	4.25	4.50	4.50	4.50	4.50	4.50	4.50
1929.....	4.80	4.50	4.25	4.25	4.50	4.25	4.50	4.50	4.25	4.00	4.00	4.00
1930.....	4.25	4.00	4.00	4.00	4.25	4.00	4.00	4.25	4.25	4.00	4.00	3.75
1931.....	3.80	3.75	3.60	3.40	3.25	3.50	3.50	3.60	3.75	3.50	3.50	3.40

Bureau of Agricultural Economics.

<sup>1</sup> Price to beekeepers or other shippers in car lots to July, 1923; thereafter, price in large lots, mostly less than car lots.<sup>2</sup> Sales by original receivers to bottlers, confectioners, bakers, and jobbers.<sup>3</sup> Price to beekeepers and other shippers, in car lots.<sup>4</sup> Price to beekeepers in large lots mostly less than car lots.

TABLE 167.—*Tobacco, unmanufactured: Acreage, production, value, exports, etc., United States, 1890-1931*

Year	Acreage	Average yield per acre	Production	Price per pound received by producers Dec. 1	Farm value, basis Dec. 1, farm price	Domestic exports, year beginning July <sup>1</sup>	Imports, year beginning July <sup>1</sup>	Net exports, year beginning July <sup>1</sup>
	<i>Acres</i>	<i>Lbs.</i>	<i>1,000 lbs.</i>	<i>Cts.</i>	<i>1,000 dolls.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>
1890	722,028	722.8	518,683	8.3	42,846	249,233	23,255	227,254
1891	738,216	747.4	551,777	8.5	47,074	255,432	21,989	234,587
1892	730,189	687.6	495,209	9.3	46,044	266,083	28,110	239,183
1893	702,952	687.1	483,024	8.1	39,155	290,085	19,663	272,983
1894	523,103	777.4	406,678	6.8	27,761	300,992	26,668	276,223
1895	633,950	775.4	491,544	7.2	35,574	295,539	32,925	266,317
1896	594,749	677.6	403,004	6.0	24,258	314,932	13,805	302,847
1897	645,604	646.0	610,880			263,020	10,477	254,907
1898	633,868	748.0	698,533			283,613	14,036	271,559
1899	1,101,460	788.1	863,118					
1899	1,101,500	728.5	802,397	7.1	57,273	344,686	19,620	326,939
1900	1,046,427	778.2	814,345	6.6	59,661	315,788	26,851	290,915
1901	1,089,199	788.0	818,953	7.1	58,288	301,007	29,429	273,770
1902	1,030,734	797.3	821,824	7.0	57,664	368,184	34,017	337,902
1903	1,037,735	788.3	815,972	6.8	55,515	311,972	31,163	286,335
1904	806,409	819.0	680,461	8.1	53,383	334,302	33,288	304,694
1905	776,112	815.6	633,034	8.5	53,519	312,227	41,126	273,912
1906	796,099	857.2	682,429	10.0	68,233	340,743	40,899	302,506
1907	820,800	850.5	698,126	10.2	71,411	330,813	35,005	297,657
1908	875,425	820.2	718,061	10.3	74,130	287,901	43,123	247,165
1909	1,264,911	815.5	1,055,765					
1909	1,264,900	814.8	1,055,133	10.1	106,374	357,196	46,838	313,085
1910	1,366,100	807.7	1,103,415	9.3	102,142	355,327	48,203	309,171
1911	1,013,000	893.7	905,109	9.4	55,210	379,845	54,740	327,199
1912	1,226,000	785.5	962,855	10.8	104,063	418,797	67,977	353,575
1913	1,216,100	784.3	953,734	12.8	122,481	449,750	61,175	391,196
1914	1,223,500	845.7	1,034,679	9.8	101,411	348,346	45,809	306,426
1915	1,389,900	775.4	1,062,237	9.1	96,281	443,263	48,073	400,624
1916	1,413,400	816.0	1,153,278	14.7	169,672	411,599	49,105	370,987
1917	1,517,800	823.1	1,249,276	24.0	300,449	289,171	86,991	211,962
1918	1,647,100	873.7	1,439,071	28.0	402,264	629,268	83,951	677,323
1919	1,864,080	796.6	1,372,993					
1919	1,951,000	751.1	1,465,481	39.0	570,868	648,038	94,005	570,858
1920	1,960,000	807.3	1,582,223	21.2	335,675	500,526	58,923	456,477
1921	1,427,000	749.6	1,069,693	19.9	212,728	463,389	55,225	403,492
1922	1,695,000	735.6	1,246,837	23.2	289,248	454,384	73,796	386,213
1923	1,877,000	807.2	1,515,110	19.9	301,096	597,630	52,380	550,404
1924	1,537,343	719.4	1,106,340					
1924	1,705,500	733.6	1,251,343	20.7	259,139	430,702	75,131	357,478
1925	1,757,300	733.3	1,376,628	18.2	250,774	537,240	68,281	470,651
1926	1,656,400	783.6	1,297,889	18.2	236,702	516,402	91,089	426,545
1927	1,584,900	764.7	1,211,900	21.2	256,882	489,966	79,112	413,299
1928	1,894,100	725.7	1,374,547	20.2	277,506	565,925	76,891	491,542
1929	1,987,300	773.5	1,537,193	18.6	286,104	600,181	63,181	541,312
1930	2,101,100	778.3	1,635,210	12.9	211,102	591,020	75,426	517,372
1931 <sup>2</sup>	2,019,600	797.2	1,610,068	9.7	166,097			

Bureau of Agricultural Economics. *Italic figures are census returns, other acreage, yield, and production figures are estimates of the crop-reporting board. See p. 970, 1927 Yearbook, for data for earlier years.*

<sup>1</sup> Compiled from Commerce and Navigation of the United States, 1890-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States; June issues 1919-1926, January and June issues, 1927-1931, and official records of the Bureau of Foreign and Domestic Commerce.

<sup>2</sup> Total exports (domestic exports plus foreign) minus imports.

<sup>3</sup> Revised on basis of 1899.

<sup>4</sup> Season average price; for 1931 based on sales previous to Dec. 15.

<sup>5</sup> Preliminary.

TABLE 168.—*Tobacco: Acreage and production, by States, average 1924-1928, annual 1928-1931*

State	Acreage					Production				
	Average 1924- 1928	1928	1929	1930	1931 <sup>1</sup>	Average 1924- 1928	1928	1929	1930	1931 <sup>1</sup>
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>
Mass.....	7,780	7,600	8,200	8,300	7,600	10,061	9,462	11,898	11,728	10,184
Conn.....	25,800	26,000	20,500	28,400	22,500	33,511	29,750	28,496	32,409	29,295
N. Y.....	1,360	800	900	900	900	1,570	1,020	1,012	855	1,170
Pa.....	38,200	37,000	40,500	41,300	40,900	50,856	49,580	51,232	39,854	58,487
Ohio.....	44,980	40,500	51,000	48,100	54,000	37,175	32,198	40,958	45,695	53,622
Ind.....	15,760	13,700	19,000	17,400	17,400	13,531	11,234	16,072	12,458	16,060
Wis.....	33,400	37,000	38,500	43,000	40,000	38,868	48,100	48,126	52,890	47,200
Minn.....	1,000	1,500	2,300	1,900	1,900	-----	1,200	1,800	2,875	2,155
Mo.....	4,600	4,000	5,200	6,200	8,100	4,377	4,400	4,732	5,879	8,508
Id.....	31,200	31,000	33,000	35,000	38,000	24,369	20,480	24,750	16,625	31,540
Va.....	191,380	180,800	178,000	186,000	186,000	127,153	104,884	119,794	112,530	108,276
N. C.....	7,660	6,800	7,400	6,800	7,200	6,053	5,100	5,513	3,906	6,328
W. C.....	599,200	728,000	736,000	706,000	689,000	407,697	499,408	487,998	585,990	468,520
S. C.....	108,400	148,000	118,000	116,000	98,000	66,469	82,288	87,084	98,600	70,070
Ga.....	72,640	122,300	96,000	114,000	84,000	52,552	84,387	89,670	104,539	59,640
Fla.....	7,930	12,000	10,700	10,900	9,100	6,715	9,216	9,680	9,756	7,598
Ky.....	413,640	388,000	468,000	519,000	586,000	330,997	300,700	392,688	372,129	506,890
Tenn.....	117,680	109,600	134,000	157,000	162,000	89,846	80,775	115,776	126,699	127,628
La.....	1,000	1,000	-----	-----	-----	422	405	-----	-----	-----
U. S.....	1,719,700	1,894,100	1,987,300	2,101,100	2,019,600	1,302,463	1,374,547	1,537,198	1,685,210	1,610,098

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.TABLE 169.—*Tobacco: Acreage, yield, and production, by types, 1930 and 1931*

Class and type	Type No.	Harvested acreage		Yield per acre		Production		Price per pound	
		1930	1931 <sup>1</sup>	1930	1931	1930	1931 <sup>1</sup>	1930 <sup>2</sup>	1931 <sup>3</sup>
<b>Flue-cured:</b>		<i>1,000 acres</i>	<i>1,000 acres</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>Cts.</i>	<i>Cts.</i>
Old belt.....	11	421.0	366.5	699	829	294,094	280,701	11.0	8.5
Virginia.....	11	133.0	106.5	572	579	76,078	61,701	7.9	7.8
North Carolina.....	11	288.0	260.0	757	650	218,016	169,000	12.0	8.9
Eastern North Carolina belt.....	12	414.0	370.0	763	688	315,882	254,697	13.4	9.4
South Carolina belt.....	13	172.8	149.2	941	732	145,292	109,238	12.4	10.0
North Carolina.....	13	56.8	51.2	822	765	46,692	39,168	13.2	11.5
South Carolina.....	13	116.0	98.0	850	715	98,600	70,070	12.0	9.2
Georgia and Florida belt.....	14	120.2	89.0	907	709	109,008	63,079	10.0	6.4
Georgia.....	14	112.9	83.0	914	707	103,233	58,720	9.9	6.4
Florida.....	14	7.3	6.0	791	726	5,775	4,359	10.4	7.0
Total, flue-cured.....	11-14	1,128.0	974.7	766	675	864,276	667,715	12.0	8.9
<b>Fire-cured:</b>									
Virginia.....	21	38.0	41.0	614	750	23,325	30,750	8.3	5.1
Clarksville and Hopkinsville.....	22	128.5	128.9	753	808	96,803	102,498	10.4	6.7
Kentucky.....	22	54.5	52.9	690	800	37,603	42,320	7.5	5.5
Tennessee.....	22	74.0	74.0	800	813	59,200	60,178	12.3	7.6
Paducah.....	23	55.5	63.0	685	842	38,033	53,075	5.7	4.9
Kentucky.....	23	48.0	55.0	688	945	32,948	46,475	5.3	4.8
Tennessee.....	23	7.5	8.0	678	825	5,085	6,600	8.2	5.5
Henderson stemming (Ky).....	24	12.0	12.8	745	853	8,940	10,944	6.9	5.0
Total, fire-cured.....	21-24	234.0	243.7	714	809	167,108	197,267	8.9	5.9
<b>Air-cured (light):</b>									
Burley.....	31	470.7	528.8	738	879	347,297	464,955	15.4	10.9
Ohio.....	31	17.0	20.4	760	954	12,920	19,458	13.6	10.9
Indiana.....	31	13.8	13.8	873	923	9,356	12,734	13.1	9.3
Missouri.....	31	6.2	8.1	918	1,050	5,679	8,505	15.4	11.0
Virginia.....	31	9.2	9.5	1,060	950	9,750	9,025	17.1	10.0
West Virginia.....	31	6.3	7.2	620	740	3,906	5,328	16.8	11.5
North Carolina.....	31	7.2	7.8	750	725	5,400	5,655	15.8	11.0
Kentucky.....	31	240.0	396.0	709	875	241,000	346,500	15.0	10.9
Tennessee.....	31	71.0	66.0	835	875	59,286	57,750	18.0	11.0
Southern Maryland.....	32	35.0	38.0	475	830	16,623	31,540	29.0	24.0
Total, air-cured (light).....	31-32	505.7	566.8	720	878	363,922	496,495	16.0	11.7

<sup>1</sup> Preliminary.<sup>2</sup> Season average price.

Based on sales previous to Dec. 15.

TABLE 169.—*Tobacco: Acreage, yield, and production, by types, 1930, and 1931—Continued*

Class and type	Type No.	Harvested acreage		Yield per acre		Production		Price per pound	
		1930	1931	1930	1931	1930	1931	1930	1931
		<i>1,000 acres</i>	<i>1,000 acres</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>Cts.</i>	<i>Cts.</i>
Air-cured (dark):									
One sucker.....	35	36.4	35.3	807	852	29,388	30,060	7.0	8.1
Indiana.....	35	3.4	3.4	850	943	2,890	3,206	6.0	12.0
Kentucky.....	35	28.5	27.9	820	855	23,370	23,854	7.0	4.0
Tennessee.....	35	4.5	4.0	695	750	3,123	3,000	8.2	0.5
Green River (Ky.).....	36	30.0	41.4	785	889	28,260	36,797	8.9	4.5
Virginia sun-cured.....	37	5.8	6.0	582	800	3,377	4,800	7.7	6.0
Total, air-cured (dark).....	35-37	78.2	82.7	780	866	61,025	71,657	7.9	4.9
Cigar filler:									
Pennsylvania Seedleaf.....	41	40.9	40.5	964	1,431	39,428	57,955	6.4	10.0
Miami Valley.....	42-44	30.5	32.6	1,061	1,007	32,347	32,844	10.1	7.5
Ohio.....	42-44	30.3	32.4	1,061	1,010	32,135	32,724	10.1	7.5
Indiana.....	42-44	.2	.2	1,080	600	212	120	9.0	9.2
Georgia and Florida Sun-grown.....	45	1.3	1.2	1,151	882	1,496	1,058	20.0	15.0
Georgia.....	45	.6	.5	1,175	870	705	435	20.0	15.0
Florida.....	45	.7	.7	1,130	890	791	623	20.0	15.0
Total, cigar filler.....	41-45	72.7	74.3	1,008	1,236	73,271	91,857	8.3	9.2
Cigar binder:									
Connecticut Valley Broadleaf.....	51	12.4	13.2	1,495	1,410	18,540	18,613	25.1	17.1
Massachusetts.....	51	.5	.5	1,500	1,412	750	706	25.0	17.0
Connecticut.....	51	11.9	12.7	1,495	1,410	17,790	17,907	25.1	17.1
Connecticut Valley Havana Seed.....	52	11.9	11.1	1,503	1,367	17,885	15,173	21.9	15.0
Massachusetts.....	52	6.4	6.0	1,490	1,400	9,536	8,400	21.0	15.0
Connecticut.....	52	5.5	5.1	1,513	1,328	8,349	6,773	23.0	15.0
New York and Pennsylvania Havana Seed.....	53	1.3	1.3	985	1,309	1,281	1,702	11.7	11.7
New York.....	53	.9	.9	1,000	1,300	855	1,170	12.0	11.5
Pennsylvania.....	53	.4	.4	1,035	1,330	426	532	11.0	12.0
Southern Wisconsin.....	54	23.2	23.1	1,256	1,221	29,130	28,200	9.8	8.0
Northern Wisconsin.....	55	22.1	18.8	1,205	1,127	26,635	21,185	10.3	8.1
Wisconsin.....	55	19.8	16.9	1,200	1,124	23,760	19,000	10.2	8.0
Minnesota.....	55	2.3	1.9	1,250	1,150	2,875	2,185	10.5	8.5
Total, cigar binder.....	51-55	70.9	67.5	1,313	1,257	93,471	84,873	15.3	11.3
Cigar wrapper:									
Connecticut Valley Shade-grown.....	61	7.4	5.8	1,042	982	7,712	5,693	90.0	80.0
Massachusetts.....	61	1.4	1.1	1,030	980	1,442	1,078	90.0	80.0
Connecticut.....	61	6.0	4.7	1,045	982	6,270	4,615	90.0	80.0
Georgia and Florida Shade-grown.....	62	3.4	2.9	1,115	1,069	3,790	3,101	60.0	50.0
Georgia.....	62	.5	.5	1,200	970	600	485	60.0	50.0
Florida.....	62	2.9	2.4	1,100	1,090	3,190	2,616	60.0	50.0
Total, cigar wrapper.....	61-62	10.8	8.7	1,065	1,011	11,502	8,794	80.1	69.5
Miscellaneous (eastern Ohio).....	-----	.8	1.2	800	1,200	640	1,440	5.9	6.6
United States.....	All	2,101.1	2,019.6	778.3	797.2	1,635,210	1,610,098	12.9	9.7

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

TABLE 170.—*Tobacco: Acreage, yield per acre, and production in specified countries, annual 1929-30 to 1931-32*

Country	Acreage			Yield per acre			Production		
	1929-30	1930-31	1931-32 <sup>1</sup>	1929-30	1930-31	1931-32	1929-30	1930-31	1931-32 <sup>1</sup>
North America, Central America, and West Indies:	1,000 acres	1,000 acres	1,000 acres	Lbs.	Lbs.	Lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.
Canada.....	36	41	—	833	887	—	29,886	36,718	48,230
United States <sup>2</sup> .....	1,087	2,101	2,020	774	778	797	1,537,193	1,635,210	1,610,068
Mexico.....	42	35	* 35	653	701	699	28,511	24,198	* 24,118
Cuba.....	150	—	—	457	—	—	68,649	82,117	—
Dominican Republic.....	—	—	—	—	—	—	44,974	24,030	—
Porto Rico.....	39	43	—	630	623	—	24,603	26,756	—
Europe:									
Sweden.....	1	1	—	1,632	1,857	—	1,233	1,344	—
Belgium.....	7	7	7	2,020	2,113	1,820	15,035	15,387	12,739
France.....	37	—	—	1,717	—	—	62,903	—	—
Spain.....	7	12	—	1,578	1,481	—	10,377	17,415	—
Italy.....	95	108	—	1,123	1,010	—	106,164	108,772	—
Germany.....	24	23	26	2,136	2,025	2,060	50,924	46,408	* 46,811
Czechoslovakia.....	16	18	22	1,282	1,242	1,263	20,207	22,095	27,778
Hungary.....	55	58	—	1,199	1,293	—	65,802	75,372	—
Yugoslavia.....	38	38	—	802	827	—	30,406	31,398	—
Greece.....	250	195	* 196	607	783	504	151,540	152,558	98,787
Bulgaria.....	94	78	77	772	678	711	72,261	52,825	54,794
Rumania.....	76	85	—	759	623	—	57,315	53,011	—
Poland.....	16	12	—	1,200	1,078	—	19,638	13,080	—
Russia.....	240	249	406	1,009	1,231	—	263,516	305,183	—
North Africa:									
Algeria.....	53	57	40	834	758	507	44,580	43,485	20,283
Tunis.....	1	1	—	881	—	—	925	925	—
Tripolitania.....	—	1	1	—	1,543	1,323	—	1,543	1,323
Asia:									
Turkey <sup>4</sup> .....	120	73	—	611	681	—	73,044	49,879	—
Iraq.....	8	14	—	1,459	1,054	—	12,376	14,560	—
Palestine.....	5	—	—	551	—	—	2,632	—	—
Syria and Lebanon.....	9	10	21	696	696	576	6,512	6,967	12,062
India.....	1,359	* 1,172	—	993	—	—	1,349,215	1,404,330	—
Ceylon.....	14	—	—	649	—	—	8,818	—	—
Indo-China.....	* 33	* 21	—	* 731	* 772	—	24,212	* 16,890	—
Japan.....	88	89	91	1,542	1,631	1,712	136,211	145,173	155,757
Chosen (Korea).....	48	35	* 37	1,190	955	—	57,180	33,291	—
Taiwan (Formosa).....	2	2	—	1,512	1,637	—	3,328	3,316	—
Siam.....	25	—	—	373	—	—	9,180	—	—
Philippine Islands.....	204	198	—	512	514	—	104,639	101,662	—
South America:									
Brazil.....	—	—	—	—	—	—	194,521	—	—
Chile.....	8	—	—	1,673	—	—	13,306	—	—
Argentina.....	30	—	—	974	—	—	29,277	—	—
South Africa:									
Union of South Africa.....	—	—	—	—	—	—	* 13,250	* 13,700	* 10,250
Southern Rhodesia.....	10 10	16	26	558	527	541	* 5,844	8,493	14,056
Northern Rhodesia.....	10 4	—	—	378	—	—	* 1,355	—	—
Nyasaland.....	52	43	—	266	372	—	13,822	15,990	* 16,000
Madagascar.....	23	32	—	801	579	—	18,651	18,519	—
Oceania:									
Java and Madura <sup>11</sup> .....	69	80	—	959	826	—	65,745	66,290	—
Sumatra <sup>8</sup> .....	52	50	—	824	825	—	42,693	41,317	—
Australia.....	2	—	—	641	—	—	1,382	—	—
Total, all countries reporting acreage or production all years.....	2,868	2,912	3,004	—	—	—	2,125,758	2,219,302	2,151,263
Estimated world total, exclusive of China <sup>12</sup> .....	—	—	—	—	—	—	5,007,000	—	—

Bureau of Agricultural Economics. Compiled from official sources and International Institute of Agriculture except as otherwise stated. Acreage and production figures are for the harvesting season. In the Northern Hemisphere data for 1930-31, for example, are for crops harvested in the summer and fall of 1930; in the Southern Hemisphere they are for crops harvested in the spring of 1931, except in the Dutch East Indies, where the harvest was largely completed in 1930.

<sup>1</sup> Preliminary.

<sup>2</sup> Revised December, 1931, on basis of 1930 census returns.

<sup>3</sup> Unofficial estimate.

<sup>4</sup> Turkey in Europe and in Asia.

<sup>5</sup> British Provinces only.

<sup>6</sup> Exclusive of Laos.

<sup>7</sup> Exclusive of Laos and Cambodia.

<sup>8</sup> Exclusive of Cambodia.

<sup>9</sup> Data for European plantations only.

<sup>10</sup> Cultivation by Europeans.

<sup>11</sup> Estate production only.

<sup>12</sup> No data are available for total production of China, which is of considerable importance.

TABLE 171.—*Tobacco: Yield per acre and estimated price per pound, December 1, by States, averages, and annual 1926-1931*

State	Yield per acre							Estimated price per pound						
	Av., 1919- 1928	1926	1927	1928	1929	1930	1931	Av., 1926- 1929	1926	1927	1928	1929	1930	1931
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
Massachusetts.....	1,344	1,448	1,223	1,245	1,451	1,413	1,340	32.7	35.0	35.7	34.1	41.6	29.7	22.0
Connecticut.....	1,341	1,340	1,223	1,190	1,370	1,385	1,302	35.3	35.6	36.6	37.2	48.1	37.1	26.5
New York.....	1,190	1,100	1,200	1,275	1,124	960	1,300	18.8	19.0	18.0	19.3	15.5	12.0	11.5
Pennsylvania.....	1,359	1,320	1,380	1,340	1,265	965	1,430	12.9	10.5	13.0	14.0	12.0	6.4	10.0
Ohio.....	869	846	819	795	803	960	993	16.3	10.1	18.4	22.0	16.0	11.1	8.7
Indiana.....	860	884	860	820	820	716	923	18.1	9.7	22.0	24.0	16.9	9.1	9.8
Wisconsin.....	1,187	1,150	1,070	1,300	1,250	1,230	1,180	15.2	13.8	16.0	14.6	15.0	10.0	8.0
Minnesota.....	-----	-----	-----	1,200	1,200	1,260	1,150	-----	-----	-----	12.0	14.5	10.5	8.6
Missouri.....	974	950	1,100	1,100	910	916	1,060	22.9	15.0	22.0	28.6	21.9	18.4	11.0
Maryland.....	773	840	818	860	750	475	830	24.0	23.7	23.0	27.3	27.7	29.0	24.0
Virginia.....	662	725	723	590	673	605	652	16.9	17.6	17.8	16.0	17.6	8.8	7.0
West Virginia.....	786	850	775	750	745	620	740	20.7	13.1	24.5	26.8	20.5	16.8	11.5
North Carolina.....	645	684	737	686	663	765	680	21.8	20.4	22.0	19.5	18.6	12.9	9.4
South Carolina.....	658	668	737	556	738	850	718	17.9	23.3	20.5	12.7	15.6	12.0	9.2
Georgia.....	658	770	725	690	915	917	710	18.1	24.0	19.4	13.2	18.7	10.3	6.8
Florida.....	933	908	835	768	900	895	835	32.8	37.5	34.8	29.1	32.2	27.4	22.5
Kentucky.....	816	842	697	775	808	717	865	18.1	10.6	21.4	25.0	17.0	12.2	9.0
Tennessee.....	738	781	780	737	864	807	859	17.7	10.5	21.4	21.2	18.6	14.7	9.0
Louisiana.....	441	400	400	405	-----	-----	-----	46.0	45.0	45.0	45.0	-----	-----	-----
United States.....	764.2	783.6	764.7	725.7	773.5	778.3	797.2	19.3	18.2	21.2	20.2	18.6	12.9	9.7

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

1 Season average price; for 1931 based on sales previous to Dec. 15.

TABLE 172.—*Tobacco: Production, stocks, supply, disappearance, and price, 1927-1931*<sup>1</sup>

## FLUE-CURED, TYPES 11-14

Year	Production <sup>2</sup>	Stocks on hand July 1	Total supply	Disappearance, year beginning July 1 <sup>3</sup>	Average price per pound	Year	Production <sup>2</sup>	Stocks on hand July 1	Total supply	Disappearance, year beginning July 1 <sup>3</sup>	Average price per pound
	Million pounds	Million pounds	Million pounds	Million pounds	Cents		Million pounds	Million pounds	Million pounds	Million pounds	Cents
1927.....	718.9	466.5	1,182.4	617.4	21.3	1930.....	864.3	599.3	1,463.6	786.8	12.0
1928.....	740.8	565.0	1,305.8	715.8	17.7	1931.....	1,657.7	676.8	1,334.5	-----	8.9
1929.....	749.8	590.0	1,339.8	740.5	18.0						

## VIRGINIA FIRE-CURED, TYPE 21

Year	Production <sup>2</sup>	Stocks on hand Oct. 1	Total supply	Disappearance, year beginning Oct. 1 <sup>3</sup>	Average price per pound	Year	Production <sup>2</sup>	Stocks on hand Oct. 1	Total supply	Disappearance, year beginning Oct. 1 <sup>3</sup>	Average price per pound
	Million pounds	Million pounds	Million pounds	Million pounds	Cents		Million pounds	Million pounds	Million pounds	Million pounds	Cents
1927.....	26.6	56.1	82.7	33.7	9.9	1930.....	23.3	27.9	51.2	22.6	8.3
1928.....	21.9	49.0	70.9	39.6	10.6	1931.....	30.8	28.6	59.4	-----	8.1
1929.....	22.8	31.3	54.1	26.2	16.9						

Bureau of Agricultural Economics. Stock prior to 1929 compiled from reports of the Bureau of the Census.

1 Production and price data, 1929-1931, revised December, 1931, on basis of 1930 census returns.

2 Green weight basis, i. e., farmers' sales weight. Disappearance includes consumption, exports, and

3 Estimated December, 1931.

## STATISTICS OF COTTON, SUGAR, AND TOBACCO

691

TABLE 172.—*Tobacco: Production, stocks, supply, disappearance, and price, 1927—1931—Continued*

## KENTUCKY AND TENNESSEE FIRE-CURED, TYPES 22 AND 23

Year	Pro- duction	Stocks on hand Oct. 1	Total supply	Disap- pear- ance, year begin- ning Oct. 1	Average price per pound		Year	Pro- duction	Stocks on hand Oct. 1	Total supply	Disap- pear- ance, year begin- ning Oct. 1	Average price per pound	
					Clarks- ville and Hop- kins- ville	Pa- du- cah						Clarks- ville and Hop- kins- ville	Pa- du- cah
	Mil- lion pounds	Mil- lion pounds	Mil- lion pounds	Mil- lion pounds	Cents	Cents		Mil- lion pounds	Mil- lion pounds	Mil- lion pounds	Mil- lion pounds	Cents	Cents
1927	81.0	161.9	242.9	128.8	18.5	12.2	1930	134.8	107.1	241.9	112.7	10.4	5.7
1928	104.2	114.1	218.3	114.2	15.6	12.7	1931	155.6	129.2	284.8	-----	6.7	4.9
1929	155.0	104.1	259.1	152.0	14.2	10.0							

## HENDERSON FIRE-CURED, TYPE 24

	pounds	pounds	pounds	pounds	Cents		pounds	pounds	pounds	pounds	Cents
1927	4.2	7.2	11.4	6.8	9.7	1930	8.9	0.7	9.6	6.5	6.9
1928	6.0	4.6	10.6	9.9	12.0	1931	10.9	3.1	14.0	-----	5.0
1929	9.5	.7	10.2	9.5	9.5						

## BURLEY, TYPE 31

1927	180.2	451.3	631.5	283.7	26.0	1930	347.3	373.0	720.3	283.5	15.4
1928	270.6	347.8	618.4	286.0	30.4	1931	465.0	436.8	901.8	-----	10.9
1929	342.2	332.4	674.6	301.6	21.8						

## SOUTHERN MARYLAND, TYPE 32

1927	26.2	21.0	48.1	23.0	23.4	1930	16.6	17.2	33.8	11.7	29.0
1928	20.5	25.1	45.6	20.6	27.2	1931	31.5	22.1	53.6	-----	24.0
1929	24.8	19.0	43.8	26.6	27.7						

## ONE-SUCKER, TYPE 35

1927	13.1	41.7	54.8	27.9	10.6	1930	29.4	25.1	54.5	22.2	7.0
1928	20.1	26.9	47.0	25.6	12.2	1931	30.1	32.3	62.4	-----	5.1
1929	29.9	21.4	51.3	26.2	10.5						

## GREEN RIVER, TYPE 36

1927	18.1	48.4	66.5	26.4	9.1	1930	28.3	23.8	52.1	27.9	8.9
1928	18.9	40.1	59.0	28.2	11.6	1931	36.8	24.2	61.0	-----	4.5
1929	27.4	30.8	58.2	34.4	10.7						

## VIRGINIA SUN-CURED, TYPE 37

1927	5.5	5.9	11.4	6.3	13.1	1930	3.4	3.9	7.3	3.8	7.7
1928	5.0	5.1	10.1	4.6	10.1	1931	4.8	3.5	8.3	-----	6.0
1929	4.1	5.5	9.6	5.7	13.2						

\* Green weight basis, i. e., farmers' sale weight. Disappearance includes consumption, exports, and losses.

\* Estimated December, 1931.

PENNSYLVANIA CIGAR LEAF, TYPES 41 AND 534

	1927	1928	1929	1930	1931		1927	1928	1929	1930	1931	
	pounds	pounds	pounds	pounds	Cents		pounds	pounds	pounds	pounds	Cents	
1927	46.2	84.1	130.3	45.7	13.0	1930	36.9	80.1	120.0	44.9	6.4	
1928	49.6	84.6	134.2	49.9	14.0	1931	\$ 58.5	75.1	133.6	-----	\$ 10.6	
1929	51.2	84.3	135.5	54.8	12.0							

1927	16.6	56.8	73.4	26.5	15.6	1930	32.3	36.4	68.7	14.5	10.1
1928	20.1	46.9	67.0	27.1	17.5	1931	32.8	54.2	87.0		7.6
1929	20.7	39.9	60.6	24.2	13.8						

1927----	15.0	37.7	52.7	21.3	21.0	1930----	18.5	24.8	43.3	13.4	25.1
1928----	14.2	31.4	45.6	14.6	21.0	1931----	\$ 18.6	29.9	48.5	-----	\$ 17.1
1929----	12.1	31.0	43.1	18.3	27.4						

Year	Production <sup>2</sup>		Stocks on hand Oct. 1	Total supply	Disappearance, year beginning Oct. 1 <sup>3</sup>	Average price per pound		Year	Production <sup>1</sup>		Stocks on hand Oct. 1	Total supply	Disappearance, year beginning Oct. 1 <sup>3</sup>	Average price per pound	
	Primed Havana seed	Havana seed				Primed Havana seed	Havana seed		Primed Havana seed	Havana seed				Primed Havana seed	Havana seed
	<i>Mil-lion lbs.</i>	<i>Mil-lion lbs.</i>	<i>Mil-lion lbs.</i>	<i>Mil-lion lbs.</i>	<i>Mil-lion lbs.</i>	<i>Cents</i>	<i>Cents</i>		<i>Mil-lion lbs.</i>	<i>Mil-lion lbs.</i>	<i>Mil-lion lbs.</i>	<i>Mil-lion lbs.</i>	<i>Mil-lion lbs.</i>	<i>Cents</i>	<i>Cents</i>
1927----	0.7	15.6	42.4	58.7	21.8	30.0	23.4	1930----	-----	17.9	32.9	50.8	17.4	-----	21.9
1928----	.6	17.5	36.9	55.0	23.6	30.0	24.0	1931----	-----	15.2	33.4	48.6	-----	-----	15.0
1929----	.3	17.8	31.4	49.5	16.6	34.9	31.1								

Year	Production	Stocks on hand Oct. 1	Total supply	Disappearance, year beginning Oct. 1	Average price per pound	Year	Production	Stock on hand Oct. 1	Total supply	Disappearance, year beginning Oct. 1	Average price per pound
	<i>Million pounds</i>	<i>Million pounds</i>	<i>Million pounds</i>	<i>Million pounds</i>	<i>Cents</i>		<i>Million pounds</i>	<i>Million pounds</i>	<i>Million pounds</i>	<i>Million pounds</i>	<i>Cents</i>
1927-----	33. 2	63. 1	116. 3	43. 8	16. 0	1930-----	55. 8	85. 3	141. 1	35. 9	10. 0
1928-----	49. 3	72. 5	121. 8	35. 1	14. 5	1931-----	49. 4	105. 2	154. 6	-----	8. 0
1929-----	49. 9	86. 7	136. 6	51. 3	15. 0						

<sup>a</sup>Green weight basis, i. e., farmers' sale weight. Disappearance includes consumption, exports, and losses.  
Estimated December, 1931. <sup>b</sup> Does not include New York Havana seed.

\* Does not include New York Havana seed.

TABLE 173.—*Tobacco: Stocks in hands of dealers and manufacturers, first of each quarter, 1927-1931*

Type and year	Jan. 1	Apr. 1	July 1	Oct. 1	Type and year	Jan. 1	Apr. 1	July 1	Oct. 1
Flue-cured, types 11, 12, 13, and 14:	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	Ohio cigar leaf (Miami Valley), types 42, 43, and 44:	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
1927	628, 674, 558, 737	656, 737, 456, 476	680, 670		1927	62, 400	72, 037	64, 386	56, 774
1928	756, 635, 678, 958	504, 939	601, 517		1928	48, 420	60, 696	55, 515	46, 875
1929	796, 870, 703, 398	589, 978	669, 070		1929	38, 868	55, 392	47, 094	39, 888
1930	795, 484, 707, 149	599, 262	687, 769		1930	34, 602	41, 448	42, 282	36, 427
1931	868, 983, 831, 347	676, 752	730, 356		1931	30, 502	54, 389	58, 455	54, 181
Virginia fire-cured, type 21:					Georgia-Florida cigar leaf, sun and shade types 45 and 62:				
1927	53, 065	73, 510	65, 052	56, 140	1927	4, 088	3, 190	1, 876	4, 879
1928	57, 000	64, 931	59, 409	49, 040	1928	4, 461	4, 019	2, 618	7, 081
1929	47, 633	49, 092	38, 216	31, 208	1929	5, 994			
1930	34, 997	40, 021	35, 625	27, 917	Georgia and Florida sun-grown, type 45:				
1931	33, 392	38, 394	33, 241	28, 607	1927		1, 174	803	2, 078
Kentucky and Tennessee fire-cured, types 22 and 23:					1930	1, 538	1, 319	1, 340	2, 345
1927	132, 340	198, 465	186, 791	161, 989	1931	2, 083	2, 223	1, 580	2, 419
1928	150, 828	168, 012	143, 883	114, 120	Porto Rico cigar leaf, type 46:				
1929	105, 902	140, 420	133, 719	104, 131	1927	18, 577	17, 639	13, 746	16, 583
1930	105, 890	158, 623	146, 855	107, 066	1928	21, 426	23, 646	21, 172	20, 067
1931	100, 551	154, 404	155, 546	129, 349	1929	22, 330	26, 128	25, 142	25, 270
Henderson fire-cured (stemming), type 24:					1930	29, 039	28, 442	24, 734	28, 510
1927	6, 145	11, 190	9, 987	7, 242	1931	27, 284	27, 932	24, 940	28, 546
1928	7, 694	8, 390	5, 314	4, 583	New England broad leaf type 61:				
1929	3, 446	2, 859	1, 288	711	1927	40, 278	46, 483	45, 925	37, 709
1930	2, 794	5, 089	2, 261	736	1928	32, 827	38, 915	32, 205	31, 441
1931	3, 788	8, 519	4, 212	3, 102	1929	28, 102	37, 880	34, 458	31, 016
Burley, type 31:					1930	29, 507	30, 072	28, 990	24, 809
1927	469, 811	586, 337	518, 363	451, 251	1931	23, 438	30, 758	33, 377	29, 969
1928	438, 267	475, 508	411, 095	347, 827	New England Havana seed, type 52:				
1929	354, 772	465, 941	396, 541	332, 382	1927	43, 524	49, 565	44, 582	42, 408
1930	352, 808	506, 378	438, 659	373, 032	1928	40, 889	45, 376	40, 066	36, 905
1931	407, 557	568, 010	500, 042	436, 802	1929	38, 076	39, 946	35, 558	31, 388
Southern Maryland, type 32:					1930	33, 487	43, 468	35, 732	32, 896
1927	18, 699	12, 447	12, 523	21, 899	1931	32, 739	42, 176	38, 265	33, 442
1928	15, 314	10, 848	12, 104	25, 132	New York Havana seed, type 53:				
1929	20, 245	13, 134	13, 293	18, 982	1927	3, 793	4, 425	3, 509	3, 196
1930	15, 304	11, 960	9, 553	17, 167	1928	2, 673	2, 601	2, 608	2, 270
1931	17, 038	14, 615	11, 756	22, 109	1929	2, 054	3, 342	2, 781	2, 200
One-stucker, type 35:					1930	2, 395	2, 811	2, 533	2, 166
1927	46, 601	59, 143	48, 245	41, 668	1931	2, 837	3, 558	3, 644	3, 034
1928	38, 813	39, 815	32, 399	26, 882	Wisconsin cigar leaf, type 54:				
1929	28, 067	37, 666	26, 496	21, 374	1927	82, 781	107, 151	96, 658	83, 058
1930	29, 852	38, 218	30, 283	25, 123	1928	69, 925	94, 135	84, 924	72, 543
1931	29, 180	46, 367	41, 026	32, 324	1929	62, 359	97, 345	97, 380	86, 701
Green River, type 36:					1930	72, 614	101, 420	97, 023	85, 274
1927	54, 161	63, 115	54, 683	48, 447	1931	73, 291	97, 518	112, 555	105, 169
1928	47, 878	49, 127	43, 722	40, 127	New England shade-grown, type 61:				
1929	41, 122	35, 968	35, 670	30, 750	1927	8, 659	7, 606	6, 494	6, 492
1930	30, 824	35, 618	28, 533	23, 786	1928	8, 363	7, 578	5, 878	6, 815
1931	27, 369	29, 308	26, 136	24, 242	1929	8, 722	8, 749	5, 954	6, 476
Virginia sun-cured, type 37:					1930	11, 329	10, 499	10, 207	10, 162
1927	5, 482	7, 966	7, 236	5, 925	1931	11, 771	10, 818	10, 255	10, 863
1928	6, 504	7, 558	6, 347	5, 052	Georgia and Florida shade, type 62:				
1929	4, 422	7, 015	6, 073	5, 492	1927		3, 844	3, 564	4, 824
1930	4, 941	5, 820	4, 935	3, 878	1930	5, 048	4, 950	3, 868	5, 921
1931	3, 855	4, 709	4, 142	3, 455	1931	5, 165	4, 428	4, 110	5, 197
Pennsylvania cigar leaf, types 41 and 53:					Miscellaneous, <sup>1</sup> eastern Ohio, export:				
1927	89, 708	113, 551	95, 539	84, 067	1927	1, 375	1, 520	1, 501	946
1928	71, 516	106, 646	95, 466	84, 649	1928	1, 501	1, 673	1, 415	985
1929	72, 424				1929	1, 614			
Pennsylvania seed-leaf, type 41:					Miscellaneous, <sup>2</sup> domestic, type 70:				
1927		115, 639	93, 861	83, 306	1927		5, 928	3, 122	2, 302
1928		93, 795	80, 252	79, 582	1928		4, 105	2, 932	2, 913
1929		80, 387	83, 011	74, 200	1930		2, 978	2, 843	2, 573
1930					1931				
1931									

Bureau of Agricultural Economics.

<sup>1</sup> Not including small quantities of other miscellaneous, e. g., Louisiana Perique.<sup>2</sup> Includes Eastern Ohio Export and all other tobacco classed as miscellaneous.

TABLE 174.—*Tobacco: Exports, by types, 1923-24 to 1930-31*

Year beginning October	Flue-cured, types 11-14 <sup>1</sup>	Virginia fire-cured, type 21	Kentucky and Tennessee fire-cured, <sup>2</sup> types 22 and 23	Burley, type 31	Southern Maryland, <sup>3</sup> type 32	Green River, <sup>4</sup> type 36
	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds
1923-24.....	266.0	27.4	167.1	7.7	19.2	16.2
1924-25.....	207.5	25.7	125.3	6.0	13.7	16.3
1925-26.....	324.4	19.3	110.0	6.8	12.3	14.4
1926-27.....	328.7	22.0	128.4	13.1	18.8	14.2
1927-28.....	328.9	21.2	84.7	7.1	12.6	8.1
1928-29.....	411.8	18.1	75.4	6.1	13.1	9.0
1929-30.....	420.9	18.1	104.5	9.7	7.8	8.0
1930-31.....	432.7	11.8	74.1	8.7	10.5	5.4

Bureau of Agricultural Economics. Compiled from reports of the Bureau of Foreign and Domestic Commerce.

<sup>1</sup> Year beginning July.

<sup>2</sup> Includes eastern Ohio.

<sup>3</sup> Includes Henderson fire-cured.

<sup>4</sup> Includes one-sucker prior to 1927-28.

TABLE 175.—*Tobacco, unmanufactured: International trade, average 1925-1929, annual, 1928-1930*

Country	Calendar year							
	Average, 1925-1929		1928		1929		1930 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
<b>PRINCIPAL EXPORTING COUNTRIES</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
United States.....	525,232	78,243	583,846	74,797	565,902	68,066	579,704	71,543
Dutch East Indies.....	170,071	11,967	154,127	11,376	161,289	17,098	131,529	<sup>2</sup> 13,690
Greece.....	109,224	<sup>3</sup> 50	108,234	44	110,351		108,455	
Brazil.....	67,864	3,869	64,495	3,772	67,251	4,703	80,949	3,733
Bulgaria.....	57,616	0	49,381	0	44,583	0	49,500	
Philippine Islands.....	47,940	674	49,371	816	64,833	505	50,279	412
Cuba.....	42,279	0	50,708	0	46,693	0	53,791	0
British India.....	40,432	16,192	42,177	16,562	37,623	17,373	38,835	12,417
Dominican Republic.....	36,528	0	31,014	0	36,297	0	28,594	0
Algeria.....	33,841	10,375	40,474	11,523	35,741	12,308	25,932	12,481
Paraguay.....	14,252	<sup>4</sup> 162	12,269		18,995			
Hungary.....	12,352	7,393		7,562	30,112	6,483	23,208	0,977
Russia.....	9,873	0	12,681	0	20,148	0	20,066	0
Yugoslavia.....	4,994	766	6,219	2,603	7,453	650	2,659	602
Ceylon.....	2,243	<sup>5</sup> 84	1,643	116	3,194		1,294	
<b>Total.....</b>	<b>1,174,781</b>	<b>129,725</b>	<b>1,221,824</b>	<b>129,231</b>	<b>1,250,465</b>	<b>127,186</b>	<b>1,199,815</b>	<b>121,855</b>
<b>PRINCIPAL IMPORTING COUNTRIES</b>								
Germany.....	679	217,778	683	244,200	916	228,112	1,997	234,658
United Kingdom.....	6,211	202,569	5,621	206,996	8,403	230,023	8,330	223,390
China.....	24,737	104,548	19,677	142,647	17,207	121,450	18,859	124,349
France.....	403	92,321	510	67,825	119	85,608	1,483	155,028
Netherlands.....	3,115	70,090	3,082	71,297	2,471	72,438	3,260	70,664
Spain.....	87	53,921	0	68,156	185	67,416	1	57,070
Belgium.....	82	44,943	83	46,129	102	47,733	366	49,314
Czechoslovakia.....	7	38,986	7	24,918	1	45,284	0	22,520
Poland.....	723	33,809	335	23,595	256	36,336	227	42,842
Austria.....	2,111	31,367	2,490	28,245	2,492	29,819	2,670	22,045
Argentina.....	417	28,945	412	26,695	451	25,443	1,042	22,575
Australia <sup>1</sup> .....	7	21,622	0	23,683	0	21,138	0	20,284
Canada.....	5,467	17,057	6,200	17,943	7,244	17,718	3,041	17,435
Egypt.....	0	16,639	0	17,117	0	17,072	0	15,805
Italy.....	7,333	16,165	7,601	13,834	9,345	16,630	7,285	12,033
Switzerland.....	92	13,166	71	13,896	172	15,651	458	16,573
Japan.....	2,952	12,855	814	14,689	280	15,261	3,295	10,473
Sweden.....	166	12,069	214	8,788	254	17,001	160	10,415
Denmark.....	2	11,835	0	12,312	0	12,523		14,097
Irish Free State.....	269	8,934	191	8,134	108	9,328		12,462
Finland.....	0	7,094	0	7,379	0	7,739	0	9,531
Norway.....	0	5,037	0	5,210	0	5,533	0	5,398
<b>Total.....</b>	<b>54,810</b>	<b>1,058,810</b>	<b>47,991</b>	<b>1,067,251</b>	<b>50,006</b>	<b>1,144,792</b>	<b>49,478</b>	<b>1,168,852</b>

Bureau of Agricultural Economics. Official sources. Tobacco comprises leaf, stems, and strippings, but not snuff.

<sup>1</sup> Preliminary. <sup>2</sup> Java and Madura only. <sup>3</sup> 2-year average. <sup>4</sup> 4-year average. <sup>5</sup> Year ended June 30.

## STATISTICS OF FRUITS AND VEGETABLES

TABLE 176.—*Almonds: Production and value, California, 1922-1931*

Year	Production	Seasonal farm price	Farm value	Year	Production	Seasonal farm price	Farm value
	<i>Short tons</i>	<i>Dollars</i>	<i>1,000 dollars</i>		<i>Short tons</i>	<i>Dollars</i>	<i>1,000 dollars</i>
1922-----	8,500	280.00	2,465	1927-----	12,000	320.00	3,840
1923-----	11,000	280.00	2,860	1928-----	14,000	340.00	4,760
1924-----	8,000	300.00	2,400	1929-----	4,700	480.00	2,256
1925-----	7,500	400.00	3,000	1930-----	13,500	200.00	2,700
1926-----	16,000	300.00	4,800	1931 <sup>1</sup> -----	14,800	* 176.00	2,608

Bureau of Agricultural Economics.

<sup>1</sup> Preliminary.

<sup>2</sup> Seasonal average price to Dec. 1.

TABLE 177.—*Apples: Production, car-lot shipments, prices and foreign trade 1919-1931*

Year	Production		Price per bushel received by producers Dec. 1	Average price of Baldwin per barrel at Boston, season November to April <sup>1</sup>	Car-lot shipments from crop of year shown		Foreign trade, year beginning July <sup>2</sup>						
	Total	Commercial			Cars	Equivalent bushels <sup>3</sup>	Domestic exports				Imports, fresh and dried in terms of fresh	Net exports <sup>4</sup>	
							Fresh	Dried	Dried in terms of fresh	Canned in terms of fresh		Total	Percentage of production
	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>Dolls.</i>	<i>Dolls.</i>		<i>1,000 bush.</i>	<i>1,000 pounds</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>P. ct.</i>	
1919	183,561												
1919	142,086	78,477	1.84	6.71		3,152	11,819	1,231		849	3,584	2.5	
1920	223,677	101,715	1.15	4.02	116,117	7,995	18,053	1,881		142	9,734	4.4	
1921	99,002	64,671	1.68	6.69	89,559	53,735	3,282	12,431	1,295	1,353	3,224	3.3	
1922	202,702	95,835	.99	4.84	113,961	68,377	5,269	12,817	1,335	189	6,415	3.2	
1923	202,842	107,808	1.02		138,184	84,405	12,295	30,410	3,168	132	15,331	7.6	
1924	188,967												
1924	171,725	84,039	1.18	5.65	103,843	61,783	9,604	19,225	2,002	324	106	11,824	6.9
1925	172,389	90,738	1.26	4.88	127,804	77,885	11,015	24,833	2,587	310	74	13,838	8.0
1926	246,609	117,384	.74	3.42	133,550	80,800	21,293	32,670	3,403	389	84	25,001	10.1
1927	123,693	75,051	1.39	6.60	93,094	53,375	9,430	21,704	2,261	330	154	11,867	9.6
1928	186,893	106,383	.99	4.66	127,530	80,151	21,043	50,024	5,221	663	117	26,810	14.3
1929	135,622	86,529	.93	5.12	102,801	64,022	10,279	23,769	2,476	481	309	12,527	9.5
1930	165,982	101,004	1.04	3.12	109,794	71,425	20,340	38,121	3,971	369	103	24,577	15.8
1931 <sup>5</sup>	211,506	104,196	.58		100,823								

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board; italic figures are census returns. Prices to producers are based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 census. Earlier years not so revised.

<sup>1</sup> Figures 1919-1923 from Boston Chamber of Commerce reports, average of weekly quotations of price actually paid by wholesale dealers on days quoted. Figures 1924-1930 from Special Apple Market Report issued by Mass. Dept. of Agr., Div. of Markets, based on prices "for sales by original receivers."

<sup>2</sup> For years 1920-1922, it is assumed that the car lots averaged 600 bushels per car. For years 1923 to 1931, inclusive, the estimates of bushels shipped have been calculated according to estimated loadings in each State.

<sup>3</sup> Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1926; January and June issues, 1927-1931; and official records of the Bureau of Foreign and Domestic Commerce.

<sup>4</sup> Total exports (domestic plus foreign) minus imports.

<sup>5</sup> Preliminary.

<sup>6</sup> December forecast of total shipments from 1931 crop.

TABLE 178.—*Apples: Production, by States, 1926-1931*

State and division	Total						Commercial <sup>1</sup>					
	1926	1927	1928	1929	1930	1931 <sup>2</sup>	1926	1927	1928	1929	1930	1931
	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>
Maine.....	2,260	2,236	1,400	2,480	2,170	1,310	1,350	1,365	861	1,800	1,410	789
New Hampshire.....	1,240	1,100	1,000	870	1,256	578	762	690	615	531	762	348
Vermont.....	800	990	560	1,029	762	800	465	570	330	633	477	501
Massachusetts.....	4,100	2,520	2,700	2,440	4,389	1,713	2,610	1,590	1,734	1,557	2,808	1,098
Rhode Island.....	391	242	230	285	452	318	237	150	144	174	270	189
Connecticut.....	1,900	1,045	1,500	830	1,615	675	1,050	540	753	489	957	402
New York.....	40,375	13,600	21,900	14,412	24,200	10,100	18,000	8,163	12,690	10,212	16,125	11,700
New Jersey.....	4,810	2,697	3,280	2,149	4,242	3,820	2,832	1,833	2,238	1,449	2,910	2,199
Pennsylvania.....	17,000	6,300	8,400	6,040	9,936	14,000	5,888	2,550	3,120	2,550	3,873	5,514
North Atlantic.....	72,376	30,730	41,040	30,535	49,022	42,014	32,724	17,451	22,494	10,395	29,592	22,740
Ohio.....	11,900	5,600	5,880	2,660	3,500	14,790	3,018	1,623	1,647	741	1,050	4,056
Indiana.....	4,100	1,249	2,520	1,085	1,240	3,990	864	276	528	245	291	888
Illinois.....	9,000	4,450	7,150	3,600	3,708	8,961	3,870	2,250	3,720	2,400	2,808	5,490
Michigan.....	9,045	4,288	5,400	6,900	5,223	9,620	4,467	2,271	3,618	3,618	8,135	5,052
Wisconsin.....	2,158	1,200	2,160	1,967	1,015	1,820	465	270	477	396	210	390
Minnesota.....	1,263	854	1,230	905	361	1,139	171	111	114	87	39	111
Iowa.....	3,652	1,720	2,740	1,650	975	1,755	402	207	330	255	150	276
Missouri.....	5,015	2,104	3,380	2,200	1,580	8,000	1,857	870	1,422	1,140	849	2,260
South Dakota.....	189	200	230	161	114	11	---	---	---	---	---	---
Nebraska.....	700	850	470	650	396	800	228	330	90	270	150	330
Kansas.....	1,428	1,925	820	1,310	601	2,020	930	1,347	540	864	396	1,404
North Central.....	48,430	24,440	31,980	23,088	18,723	52,706	16,272	9,555	11,655	10,014	9,078	20,307
Delaware.....	2,376	1,150	1,520	911	1,600	1,785	1,980	900	1,290	819	1,401	1,200
Maryland.....	3,500	1,700	2,190	2,200	1,650	3,582	1,800	1,200	1,328	1,365	990	1,740
Virginia.....	19,902	6,600	16,100	13,054	7,700	21,889	11,100	4,950	11,100	9,300	4,350	10,500
West Virginia.....	10,875	5,000	8,750	5,716	4,308	12,954	5,100	4,050	4,410	4,200	2,040	4,791
North Carolina.....	5,988	1,825	5,010	2,628	2,555	5,475	1,035	273	750	450	300	822
South Carolina.....	647	363	480	180	300	374	---	---	---	---	---	---
Georgia.....	1,827	595	1,400	650	1,126	1,500	456	240	351	216	327	300
South Atlantic.....	45,113	17,233	35,480	25,339	19,237	47,559	21,471	11,613	19,227	16,350	9,408	19,353
Kentucky.....	6,408	720	5,700	1,400	935	5,390	501	75	456	159	96	558
Tennessee.....	5,360	1,152	3,790	1,375	1,300	3,780	375	81	264	138	114	300
Alabama.....	1,328	328	885	437	608	1,100	---	---	---	---	---	---
Mississippi.....	824	152	250	140	160	272	---	---	---	---	---	---
Arkansas.....	3,450	1,015	2,200	1,300	1,441	4,200	1,500	609	1,242	660	780	2,457
Louisiana.....	35	18	30	17	25	39	---	---	---	---	---	---
Oklahoma.....	770	493	350	488	226	400	93	60	33	66	21	60
Texas.....	330	168	216	190	125	215	---	---	---	---	---	---
South Central.....	18,055	4,046	13,421	5,347	4,820	15,396	2,469	825	1,995	1,023	1,011	3,375
Montana.....	410	295	516	555	505	434	309	163	450	345	393	300
Idaho.....	4,200	6,000	5,800	5,350	5,200	5,000	2,775	5,478	4,800	4,680	4,650	3,969
Wyoming.....	47	40	48	56	49	24	---	---	---	---	---	---
Colorado.....	3,444	2,592	3,020	2,300	1,060	2,090	2,907	2,253	2,700	2,160	1,005	1,500
New Mexico.....	1,147	456	675	1,136	448	1,089	600	360	507	840	306	450
Arizona.....	112	62	76	84	74	97	33	30	24	27	27	30
Utah.....	817	660	880	610	1,100	400	480	450	570	245	945	225
Nevada.....	42	18	52	42	50	35	---	---	---	---	---	---
Washington.....	34,030	25,343	33,500	29,500	37,850	31,400	25,950	22,302	30,000	24,687	33,597	25,200
Oregon.....	8,036	4,320	7,600	3,800	6,200	4,150	5,250	2,925	5,100	2,250	4,470	2,100
California.....	10,360	7,458	13,105	7,880	11,644	9,112	6,144	4,656	6,861	4,413	6,522	4,647
Western.....	62,635	47,244	64,972	51,313	64,180	53,831	44,448	38,607	51,012	39,747	51,915	38,421
United States.....	246,609	123,693	186,893	135,622	155,982	211,506	117,384	78,061	106,383	86,529	101,004	104,196

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Estimates of production for 1929 and 1930 revised on basis of 1930 census. Earlier years not so revised.

<sup>1</sup> Included in "Total crop." By commercial crop is meant that portion of the total crop which is sold for consumption as fresh fruit.

<sup>2</sup> Preliminary.

## STATISTICS OF FRUITS AND VEGETABLES

697

TABLE 179.—Apples: Car-lot shipments by State of origin, 1930-31 and 1931-32 and total United States shipments, 1923-24 to 1931-32 <sup>1</sup>

State and crop season	Crop-movement season <sup>2</sup>														
	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total	
EASTERN															
New England States:	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	
1930-31			1	481	1,177	1,072	327	146	40	28	6			3,278	
1931-32			2	363	357	31	5								
New York:															
1930-31		29	493	1,448	3,642	2,875	1,477	1,878	1,723	1,091	462	258	53	15,429	
1931-32		5	121	817	1,344	988	666						1		
Pennsylvania:															
1930-31		39	51	234	961	585	220	285	228	144	14			2,765	
1931-32		26	24	173	1,021	609	300								
Illinois:															
1930-31	257	339	256	1,080	1,198	66	36	34	22	41	32	27		3,388	
1931-32	253	679	183	969	1,717	488	119								
Michigan:															
1930-31		29	270	450	983	116	23	7	3	2		1		1,884	
1931-32		4	90	327	1,343	673	116								
Missouri:															
1930-31	6	45	62	179	148	24	10	4	17	35	5	6		541	
1931-32		27	54	312	479	154	27								
Delaware:															
1930-31	25	732	65	110	290	79	19	12	19	2				1,353	
1931-32	2	404	18	47	186	38	2								
Maryland:															
1930-31	16	203	44	221	607	242	21	9	8	6				1,378	
1931-32	2	114	58	263	815	478	156								
Virginia:															
1930-31		89	76	931	2,967	1,180	538	604	493	348	111	39	26	7,402	
1931-32		124	112	1,900	5,653	2,722	1,039								
West Virginia:															
1930-31	3	95	95	572	1,690	585	92	110	87	35	16	1		3,381	
1931-32	1	92	135	839	2,759	1,945	440								
Arkansas:															
1930-31	15	21	110	32	122	11	9	6	2	3				331	
1931-32	8	2	73	181	45	15	2								
Other Eastern:															
1930-31	66	293	209	456	585	152	48	66	73	122	20	25	11	2,126	
1931-32	73	224	133	846	1,915	681	204								
Total Eastern:															
1930-31	388	1,915	1,732	6,194	14,370	6,990	2,820	3,161	2,715	1,857	666	357	91	43,256	
1931-32	339	1,700	1,003	7,037	17,634	8,820	3,076								
WESTERN															
Idaho:															
1930-31		2	1	1,031	3,242	1,056	650	522	298	111	53	6		6,972	
1931-32			1	1,179	1,964	693	550								
Colorado:															
1930-31				10	639	251	88	57	26	10	1			1,082	
1931-32				70	465	242	106								
Washington:															
1930-31		56	391	4,470	13,867	7,393	3,998	3,752	3,763	3,381	2,036	1,456	654	45,217	
1931-32		47	257	3,479	8,359	4,081	3,242								
Oregon:															
1930-31		7	44	306	2,400	1,357	473	277	249	226	161	96	23	5,624	
1931-32			33	181	843	248	202								
California:															
1930-31	32	1,347	695	1,092	1,288	471	157	161	173	164	174	156	43	5,953	
1931-32	61	1,383	620	735	457	113	57								
Other Western:															
1930-31			67	256	1,046	233	49	18	12	4	5			1,690	
1931-32			55	109	278	76	12								
Total Western:															
1930-31	32	1,412	1,198	7,165	22,482	10,761	5,415	4,787	4,521	3,896	2,430	1,714	725	66,538	
1931-32	61	1,435	966	5,753	12,366	5,453	4,169								
Total:															
1923-24	152	3,360	4,122	16,639	49,876	26,571	8,061	8,299	8,213	6,370	3,469	2,295	707	138,184	
1924-25	205	2,362	3,126	14,641	39,886	20,231	6,399	5,294	4,023	3,277	2,295	1,615	509	103,843	
1925-26	433	2,895	4,330	20,905	44,895	20,085	7,372	6,253	5,855	5,228	4,114	2,494	945	127,804	
1926-27	260	3,840	3,387	20,950	45,321	23,251	8,365	7,969	5,020	5,345	3,596	2,355	888	133,550	
1927-28	253	1,815	3,539	12,106	33,556	17,109	5,963	5,315	4,900	3,500	2,355	1,819	864	93,094	
1928-29	230	3,452	4,330	19,405	45,901	19,774	8,308	7,774	7,749	5,418	2,944	1,710	534	127,530	
1929-30	514	2,022	3,791	13,996	37,638	14,648	5,926	5,233	5,397	5,217	3,662	1,974	686	102,801	
1930-31	420	3,327	2,930	13,359	36,852	17,751	8,235	7,948	7,236	5,753	3,096	2,071	816	109,794	
1931-32	400	3,135	1,969	12,790	30,000	14,273	7,245								

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis. See preceding Yearbooks for data for earlier years.

<sup>1</sup> Beginning January, 1931, figures are subject to revision.

<sup>2</sup> Crop movement season extends from June of one year through June of the following year.

TABLE 180.—Apples: Cold-storage holdings, 1922-1931

BARRELS<sup>1</sup>

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	Oct. 1	Nov. 1	Dec. 1
	1,000 barrels	1,000 barrels	1,000 barrels	1,000 barrels	1,000 barrels	1,000 barrels	1,000 barrels	1,000 barrels	1,000 barrels
1922.....	1,742	1,424	996	561	248	74	1,219	4,133	4,319
1923.....	3,708	2,839	2,013	1,199	578	150	584	4,226	5,010
1924.....	4,512	3,634	2,755	1,768	1,044	430	479	3,172	3,709
1925.....	3,254	2,498	1,803	1,046	504	165	885	3,749	4,245
1926.....	3,855	3,157	2,288	1,307	617	221	484	3,188	4,554
1927.....	4,077	3,178	2,152	1,286	650	229	449	1,864	2,055
1928.....	1,699	1,266	846	501	262	121	652	2,978	2,889
1929.....	2,354	1,678	1,128	652	319	108	735	2,189	2,097
1930.....	1,762	1,316	897	481	229	96	500	1,571	1,456
1931.....	1,197	834	482	200	86	38	398	2,285	2,177

BUSHEL BASKETS<sup>2</sup>

	1,000 baskets	1,000 baskets	1,000 baskets	1,000 baskets	1,000 baskets	1,000 baskets	1,000 baskets	1,000 baskets	1,000 baskets
1922.....	1,351	1,078	808	471	208	64	241	1,179	1,400
1923.....	1,167	940	608	314	117	29	193	1,138	1,374
1924.....	2,103	1,672	1,138	672	329	124	519	2,050	2,419
1925.....	2,472	2,037	1,589	952	553	199	724	3,809	3,905
1926.....	3,177	2,315	1,536	900	400	222	1,084	4,932	5,057
1927.....	4,240	3,204	2,171	1,308	590	220	1,793	6,379	6,613
1928.....	5,507	4,005	2,805	1,555	763	309	1,982	6,748	6,946
1929.....	5,998	4,460	2,855	1,300	571	193	2,032	9,787	10,817

## BOXES

	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes
1922.....	11,061	8,667	6,282	4,107	2,088	721	669	4,164	7,271
1923.....	8,310	7,612	5,593	3,345	1,475	380	789	6,886	13,580
1924.....	14,201	11,550	8,821	5,837	2,901	949	829	6,620	9,917
1925.....	9,089	7,264	5,266	3,412	1,801	674	1,091	9,165	13,041
1926.....	11,828	10,009	7,898	5,350	2,892	1,104	1,809	9,523	15,083
1927.....	13,365	10,435	7,298	4,613	2,312	717	1,043	9,074	13,423
1928.....	12,260	9,809	7,023	4,960	2,889	1,223	1,854	12,333	17,452
1929.....	15,853	12,388	7,995	4,889	2,224	631	901	11,045	16,235
1930.....	13,108	10,149	7,282	4,790	2,440	701	2,135	15,669	21,267
1931.....	19,137	15,347	11,371	6,852	3,683	1,425	3,208	15,472	16,949

TOTAL, IN BUSHELS<sup>3</sup>

	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1922.....	16,267	12,939	9,270	5,790	2,852	942	4,356	16,503	20,229
1923.....	10,443	10,128	11,631	6,942	3,210	831	2,781	20,742	30,297
1924.....	20,088	23,529	17,895	11,613	6,240	2,304	2,460	17,274	22,419
1925.....	20,019	16,099	11,283	6,864	3,429	1,197	4,266	22,467	28,101
1926.....	25,536	21,153	15,900	9,942	5,073	1,890	3,612	21,321	31,458
1927.....	28,008	22,005	15,342	9,423	4,794	1,602	3,114	17,976	23,493
1928.....	20,534	15,923	11,097	7,363	4,134	1,808	4,893	26,190	31,177
1929.....	27,154	20,626	13,551	8,153	3,772	1,174	4,900	23,991	28,130
1930.....	23,902	18,102	12,778	7,787	3,895	1,358	5,618	27,129	32,580
1931.....	28,725	22,317	15,672	8,761	4,512	1,731	6,429	32,115	34,197

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

<sup>1</sup> Previous to Oct. 1, 1923, apples packed in bushel baskets are included in this tabulation on a basis of 3 bushels to the barrel.<sup>2</sup> Prior to Oct. 1, 1923, included with barreled apples.<sup>3</sup> 1 barrel is considered the equivalent of 3 boxes or 3 bushel baskets.

## STATISTICS OF FRUITS AND VEGETABLES

699

TABLE 181.—Apples:<sup>1</sup> *International trade, average 1925-1929, annual 1927-1930*

Country	Calendar year									
	Average 1925-1929		1927		1928		1929		1930 <sup>2</sup>	
	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports
PRINCIPAL EXPORTING COUNTRIES	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.
United States	14,448	137	15,534	163	13,635	112	16,856	288	15,850	157
Canada	3,626	542	2,902	631	2,977	633	4,665	440	6,390	455
Australia <sup>3</sup>	2,161	0	1,316	0	3,619	0	1,342	0	3,621	0
France <sup>4</sup>	1,880	638	1,729	491	956	615	422	1,534	1,316	1,895
Italy	1,597	1	1,659	0	1,405	1	1,906	1	1,908	3
Netherlands	1,309	422	1,462	401	555	301	1,735	557	448	778
Belgium	1,122	303	1,301	361	773	274	1,105	405	1,005	705
Rumania	<sup>5</sup> 784	<sup>5</sup> 0	<sup>5</sup> 509	<sup>5</sup> 0						
Yugoslavia	733	2	719	1	463	0	1,125	0	2,055	2
New Zealand	565	31	441	36	814	21	789	30	1,072	27
Total	28,275	2,076	27,572	2,084	25,227	2,047	29,951	3,211	34,298	4,055
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom	0	14,247	0	13,511	0	13,401	0	12,832	0	13,583
Germany	34	8,415	31	7,891	17	9,777	38	7,501	40	11,195
Sweden	0	754	0	757	0	874	0	998	150	683
Denmark	0	684	0	943	0	638	0	825		689
Irish Free State	0	469	0	449	0	441	0	441		449
Egypt	2	379	2	366	3	345	3	487	<sup>4</sup> 1	260
Norway <sup>4</sup>	0	202	0	249	0	186	0	219		169
Brazil	0	191	0	128	0	214	0	268		114
Finland	0	178	0	161	0	210	0	218		168
Cuba	0	96	0	130	0	94	0	78		80
Poland	18	88	8	30	25	49	7	274	150	484
Total	54	25,703	41	24,615	45	26,229	48	24,141	341	27,972

Bureau of Agricultural Economics. Official sources.

<sup>1</sup> Foreign weights are converted to bushels on the basis of 48 pounds per bushel; domestic, 1 barrel equals 3 boxes (or bushels). <sup>2</sup> Preliminary. <sup>3</sup> Year ended June 30. <sup>4</sup> Includes pears. <sup>5</sup> 3-year average.TABLE 182.—Apples: *Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32*

Crop year	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	Weighted average
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1922-23	202.7	181.7	100.4	94.3	93.4	101.5	108.6	131.5	142.3	144.9	156.5	178.7	109.4
1923-24	188.6	166.7	121.4	108.0	114.0	114.6	114.0	121.3	128.0	129.1	129.4	131.3	117.4
1924-25	159.3	141.3	121.6	109.9	115.9	119.5	128.2	144.9	150.7	155.4	158.4	179.2	122.1
1925-26	201.4	158.7	130.7	112.5	120.5	127.7	137.4	146.3	148.3	139.8	143.2	148.2	127.0
1926-27	168.7	133.8	103.8	88.4	80.2	81.6	87.7	97.3	98.8	100.0	103.8	113.5	88.3
1927-28	140.0	144.4	135.8	130.7	134.7	141.8	152.4	161.7	168.3	177.0	183.3	190.6	141.7
1928-29	188.7	156.0	105.5	96.6	99.4	107.9	118.5	124.1	129.9	134.1	133.5	147.9	110.3
1929-30	153.1	160.5	138.9	131.0	137.9	135.6	143.4	148.3	154.0	155.2	159.9	168.2	141.4
1930-31	173.6	144.8	106.3	103.2	98.4	96.7	98.8	103.8	106.0	105.5	117.1	121.9	102.7
1931-32	131.5	107.9	77.4	70.7	58.9	61.3	64.7						

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by car-lot shipments.

TABLE 183.—*Apricots: Production and value, California, 1922-1931*

Year	Production	Seasonal farm price	Farm value	Year	Production	Seasonal farm price	Farm value
	Short tons	Dollars	1,000 dolls.		Short tons	Dollars	1,000 dolls.
1922	145,000	70.00	10,150	1927	208,000	57.00	11,856
1923	210,000	25.00	5,250	1928	175,000	50.00	8,750
1924	142,000	46.00	6,532	1929	215,000	63.00	13,545
1925	150,000	54.00	8,100	1930	200,000	39.00	7,476
1926	176,000	68.00	11,088	1931 <sup>2</sup>	245,000	29.00	6,980

Bureau of Agricultural Economics.

<sup>1</sup> Includes some fruit not harvested on account of market conditions (but not included in computing value), as follows: 1930, 8,300 tons; 1931, 4,000 tons.<sup>2</sup> Preliminary.<sup>3</sup> Seasonal average price to Dec. 1.

TABLE 184.—*Asparagus, commercial crop: Acreage, production, and price per crate or ton, 1928-1931*

Utilization	Acreage				Production				Seasonal farm price			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>1,000 crates<sup>1</sup></i>	<i>1,000 crates<sup>1</sup></i>	<i>1,000 crates<sup>1</sup></i>	<i>1,000 crates<sup>1</sup></i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
For market.....	49,620	46,400	52,890	63,940	3,957	3,446	4,510	5,283	2.44	2.71	2.27	2.01
For manufacture....	39,550	45,780	44,670	38,840	<i>Tons<sup>2</sup></i>	<i>Tons<sup>2</sup></i>	<i>Tons<sup>2</sup></i>	<i>Tons<sup>2</sup></i>	79.40	81.91	81.17	75.25
					<i>1,000 crates</i>	<i>1,000 crates</i>	<i>1,000 crates</i>	<i>1,000 crates</i>				
Total.....	89,170	92,180	97,560	102,780	9,199	9,472	10,524	9,307	1.59	1.61	1.58	1.55

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and canning establishments.

<sup>1</sup> Crates containing approximately 24 pounds.

<sup>2</sup> Short tons.

TABLE 185.—*Beans, snap, commercial crop: Acreage, production, and price per bushel or ton, 1928-1931*

Utilization	Acreage				Production				Seasonal farm price			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>1,000 bush.<sup>1</sup></i>	<i>1,000 bush.<sup>1</sup></i>	<i>1,000 bush.<sup>1</sup></i>	<i>1,000 bush.<sup>1</sup></i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
For market.....	96,180	94,380	110,580	114,000	7,370	8,937	10,298	9,615	1.72	1.63	1.39	1.30
For manufacture....	45,640	65,040	78,690	54,110	<i>Tons<sup>2</sup></i>	<i>Tons<sup>2</sup></i>	<i>Tons<sup>2</sup></i>	<i>Tons<sup>2</sup></i>	61.24	62.70	62.15	53.69
Total.....	141,820	159,420	189,270	168,110	12,000	13,300	15,400	14,480	106.88	101.84	92.16	87.42

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and canning establishments.

<sup>1</sup> Bushels containing approximately 24 pounds.

<sup>2</sup> Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

<sup>3</sup> Short ton.

TABLE 186.—*Beans, snap: Car-lot shipments, by State of origin, 1920-1931*

State	Calendar year											
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931 <sup>1</sup>
	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>
New York.....	43	28	11	33	81	62	39	31	49	69	30	101
New Jersey.....	90	111	68	15	100	48	56	203	110	61	114	129
Maryland.....	159	22	149	49	136	127	197	235	246	214	352	479
Virginia.....	155	79	268	101	899	570	841	877	657	1,025	541	591
North Carolina.....	133	128	219	261	559	459	550	504	690	736	908	710
South Carolina.....	142	331	503	585	517	334	449	425	439	779	682	703
Georgia.....	6	26	65	26	68	27	51	96	48	152	230	171
Florida.....	607	367	715	1,044	1,157	1,922	946	2,583	2,700	3,254	4,118	4,319
Tennessee.....	20	23	63	81	248	84	174	45	119	132	233	83
Mississippi.....	105	79	252	47	85	88	130	143	122	312	310	209
Arkansas.....	2	—	1	2	7	13	18	18	69	92	130	88
Louisiana.....	35	202	90	107	439	683	583	662	822	1,156	744	852
Texas.....	7	39	26	88	210	407	414	471	204	356	654	606
Colorado.....	—	—	2	—	—	5	—	5	3	58	165	76
California.....	17	60	20	26	32	118	127	60	116	77	119	93
Other States.....	12	65	144	59	144	116	126	123	132	153	139	154
Total.....	1,533	1,560	2,596	3,124	4,682	5,133	4,706	6,481	6,686	8,620	9,559	9,314

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis. Beginning 1931 figures include lima beans in pod.

<sup>1</sup> Preliminary.

<sup>2</sup> Figures for Florida include cars moved in preceding calendar year, as follows: 1920, 35 cars in November and 87 in December; 1921, 11 cars in November and 1 in December; 1922, 26 cars in November and 26 in December; 1923, 41 cars in November and 46 in December; 1924, 1 car in October, 75 in November, and 215 in December; 1925, 73 cars in November and 154 in December; 1926, 1 car in October, 177 in November, and 140 in December; 1927, 14 cars in October, 183 in November, and 300 in December; 1928, 29 cars in October, 710 in November, and 547 in December; 1929, 3 cars in October, 160 in November, and 203 in December; 1930, 9 cars in October, 298 in November, and 993 in December; 1931, 224 cars in October, 1,019 in November, and 333 in December.

## STATISTICS OF FRUITS AND VEGETABLES

701

TABLE 187.—Cabbage, commercial crop: Acreage, production, and price per ton, by States, 1928-1931

FOR MARKET AND SAUERKRAUT

Group and State	Acreage				Production				Seasonal farm price to Dec. 1, per ton			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Fall:	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Tons</i> <sup>1</sup>	<i>Tons</i> <sup>1</sup>	<i>Tons</i> <sup>1</sup>	<i>Tons</i> <sup>1</sup>	<i>Dols.</i>	<i>Dols.</i>	<i>Dols.</i>	<i>Dols.</i>
South Carolina	600	350	750	900	2,400	2,900	9,400	9,000	46.75	68.50	36.00	41.76
Virginia, Norfolk	180	180	300	100	900	1,100	1,300	100	71.08	50.00	85.00	43.50
Group total	780	530	1,050	1,000	3,300	4,000	10,700	9,100	53.33	63.50	85.89	41.76
Early: <sup>2</sup>												
California	4,850	4,600	4,050	4,400	29,600	24,800	20,700	28,000	31.01	21.01	28.02	15.28
Florida	2,900	6,500	3,700	6,500	16,000	39,000	25,500	45,100	36.93	33.60	63.20	22.40
Louisiana, winter	3,700	3,600	3,000	2,800	21,000	16,400	9,900	11,500	23.09	22.10	35.75	16.00
Texas	15,940	20,400	13,000	20,900	91,900	118,300	82,800	161,400	19.15	13.58	46.35	5.60
Group total	27,290	35,000	28,750	40,600	158,600	198,500	138,900	247,000	23.68	19.14	45.96	10.81
Second early:												
Alabama	2,200	2,050	1,550	1,950	10,800	10,200	7,800	13,300	62.62	20.00	45.00	14.00
Georgia	100	720	410	400	300	3,600	3,000	2,900	30.60	20.00	35.00	15.00
Mississippi	2,700	3,600	2,850	3,100	14,500	20,500	12,800	15,500	45.50	21.30	37.00	13.50
North Carolina	680	850	800	700	3,400	6,000	4,800	3,500	54.00	20.00	44.00	14.00
South Carolina	2,500	3,300	3,100	3,000	15,500	29,000	31,000	31,800	49.02	31.50	42.50	15.38
Virginia	4,900	4,800	4,750	4,150	17,200	37,500	20,200	18,400	33.72	26.37	28.47	18.02
Eastern Shore	1,500	1,900	1,250	1,000	7,000	17,500	6,200	5,200	27.58	20.00	25.00	18.80
Norfolk	3,400	2,900	3,500	3,150	10,200	20,300	14,000	13,200	37.97	30.00	30.00	19.00
Group total	13,080	15,320	13,460	13,300	62,000	107,100	79,600	85,300	46.45	25.27	38.12	15.21
Intermediate:												
Arkansas	450	400	450	500	2,000	1,000	1,100	2,500	14.00	12.50	29.50	13.00
Delaware	250	250	250	250	1,400	1,700	1,200	1,600	40.00	20.00	28.00	14.65
Illinois	1,700	1,590	2,320	2,090	15,500	16,100	20,000	12,500	11.35	19.75	16.40	16.15
Iowa	1,480	1,650	2,000	1,400	13,300	10,600	12,400	7,100	16.05	22.83	15.08	11.70
Kentucky	260	180	140	200	1,600	1,600	600	1,400	15.00	30.00	34.00	20.00
Maryland	2,000	2,320	2,500	1,780	12,800	16,500	10,200	9,600	22.40	19.85	35.20	14.27
Missouri	950	880	950	980	5,200	6,000	6,100	5,100	11.25	16.38	20.82	17.50
New Jersey	4,000	4,500	4,800	4,100	23,200	22,500	26,900	26,200	30.00	28.00	22.00	20.40
New Mexico	500	600	450	230	3,500	5,400	3,400	1,800	20.00	22.00	20.00	15.00
New York, Long Island	3,090	3,020	2,980	2,930	27,200	30,800	26,400	29,300	23.00	26.25	13.50	18.00
Ohio, southeast	850	840	350	1,050	8,500	7,400	700	11,600	16.40	25.30	27.45	19.00
Tennessee	2,120	3,000	2,730	2,200	12,900	17,700	18,800	10,600	14.81	20.90	27.25	16.65
Virginia, southwest	2,700	2,650	2,650	2,460	27,000	17,500	6,600	14,800	16.96	33.66	16.97	9.93
Washington	1,950	2,000	2,000	2,050	14,000	17,200	18,800	18,400	17.63	11.00	15.75	13.00
Group total	22,300	24,140	24,820	22,220	168,100	172,000	153,200	152,500	19.45	23.11	20.72	16.12
Late (domestic):												
Colorado	1,300	1,400	1,700	1,600	18,200	12,200	19,000	11,800	9.51	22.13	9.37	18.00
Indiana	1,510	1,960	2,350	2,300	15,700	12,700	15,000	15,300	10.46	11.59	9.27	12.30
Michigan	2,820	2,980	3,780	3,320	23,400	18,400	22,700	21,600	9.23	9.84	8.11	6.20
Minnesota	910	1,050	1,210	1,150	9,800	8,200	9,000	5,300	8.57	8.78	10.89	11.60
New York	8,960	9,980	11,750	10,000	69,000	97,800	94,000	80,000	18.35	13.85	8.89	6.30
Ohio	2,610	2,900	3,820	2,670	22,700	24,900	20,800	23,800	9.21	7.71	7.79	6.00
Oregon	1,550	1,600	1,630	1,600	13,200	8,000	13,000	14,400	28.88	18.00	15.00	12.50
Pennsylvania	1,110	1,120	1,180	1,130	9,000	11,200	9,400	8,700	21.89	16.79	21.38	10.00
Utah	360	300	630	310	3,600	4,000	10,000	3,800	14.44	15.40	5.90	16.00
Wisconsin	7,690	10,200	14,500	9,570	79,200	81,600	111,100	51,700	9.72	12.00	8.39	7.00
Group total	28,820	33,470	42,610	33,710	263,800	279,600	324,000	236,400	13.36	12.81	9.21	8.17
Late (Danish):												
Colorado	1,600	1,900	2,200	2,200	23,400	22,800	26,700	19,800	14.38	19.80	8.15	13.00
Indiana	200	350	350	350	1,800	1,800	2,600	2,600	19.00	18.00	12.90	8.90
Michigan	350	360	600	3,000	3,000	2,500	3,900	3,900	19.26	21.70	14.25	8.80
Minnesota	1,590	2,450	1,980	1,650	16,100	13,500	9,400	6,600	16.96	22.69	11.60	11.50
New York	19,170	19,640	20,920	21,550	134,200	157,100	154,800	183,200	25.79	16.86	10.08	5.80
Ohio	430	430	450	420	3,000	3,000	2,900	3,200	26.61	14.85	11.90	11.00
Pennsylvania	550	670	710	700	3,800	4,700	4,000	5,600	28.06	20.00	10.85	8.00
Wisconsin	6,750	8,640	11,180	7,430	72,200	67,400	83,800	36,400	19.70	17.93	6.40	9.80
Group total	30,440	34,290	38,370	34,900	255,700	272,800	290,900	261,300	22.46	17.72	8.98	7.28

<sup>1</sup> Short ton.<sup>2</sup> Season begins in fall of previous year.<sup>3</sup> Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

TABLE 187.—Cabbage, commercial crop: Acreage, production, and price per ton, by States, 1928-1931—Continued

FOR MARKET AND SAUERKRAUT

Group and State	Acreage				Production				Seasonal farm price to Dec. 1, per ton			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Late (total):	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Tons</i> <sup>1</sup>	<i>Tons</i> <sup>1</sup>	<i>Tons</i> <sup>1</sup>	<i>Tons</i> <sup>1</sup>	<i>Dols.</i>	<i>Dols.</i>	<i>Dols.</i>	<i>Dols.</i>
Colorado	2,900	3,300	3,900	3,800	41,600	35,000	48,700	31,600	12.24	20.43	8.62	14.84
Indiana	1,510	2,160	2,700	2,710	15,700	14,500	16,800	17,900	10.45	12.76	10.18	12.40
Michigan	3,170	3,320	4,380	3,920	26,400	20,900	26,600	25,500	10.38	11.24	9.02	6.63
Minnesota	2,500	3,500	3,170	2,800	25,900	21,700	18,400	11,900	13.78	17.37	11.20	11.51
New York	28,130	29,620	32,670	31,550	203,200	254,900	248,800	263,200	23.26	15.71	9.60	5.95
Ohio	3,040	3,330	4,030	3,090	25,700	27,900	23,700	27,000	11.25	8.49	8.31	6.59
Oregon	1,550	1,600	1,630	1,600	13,200	8,000	13,000	14,400	29.88	18.00	15.00	12.50
Pennsylvania	1,660	1,790	1,890	1,830	12,800	15,900	14,000	14,300	24.06	17.74	17.93	9.23
Utah	360	300	300	310	3,600	4,000	10,000	3,800	14.44	15.40	5.90	16.00
Wisconsin	14,440	18,840	25,980	17,000	151,400	149,000	194,900	88,100	14.48	14.68	7.53	8.16
Group total	59,260	67,780	80,980	68,610	519,500	553,400	614,900	497,700	17.94	15.23	9.10	7.70
Miscellaneous	50	70	230	280	400	600	1,300	1,200	7.50	8.33	11.54	10.00
Total, all States	122,760	142,820	148,990	146,010	911,900	1,034,000	998,600	992,800	21.22	18.51	18.62	10.03

## FOR MARKET

Fall	780	530	1,050	1,000	3,300	4,000	10,700	9,100	53.33	63.50	35.89	41.76
Early	27,290	35,000	28,750	40,600	168,600	198,500	138,900	* 247,000	23.68	19.14	45.96	8.36
Second Early	13,080	15,320	13,460	13,300	62,000	107,100	79,600	* 85,300	46.48	25.27	38.12	12.25
Intermediate:												
Illinois	1,030	1,220	1,520	1,540	9,300	11,100	13,800	10,900	10.65	21.80	19.28	16.97
Iowa	1,300	1,330	1,200	1,100	11,600	7,600	9,700	6,200	17.07	07.50	17.22	12.42
Tennessee	1,870	2,640	2,130	1,850	11,400	15,800	13,700	7,600	14.66	21.65	32.92	19.21
Virginia	2,200	2,200	2,200	2,180	22,000	14,500	5,200	13,000	10.08	14.18	16.40	10.15
Washington	1,690	1,680	1,680	1,850	11,800	14,300	15,900	16,700	19.07	10.98	15.86	12.99
Other States	12,320	12,920	12,700	11,900	85,200	92,600	76,100	* 85,200	23.24	24.45	22.79	17.80
Total	20,410	21,990	21,430	20,400	151,300	155,900	134,400	* 142,000	20.26	24.16	22.08	16.32
Domestic (late):												
Colorado	800	900	1,200	1,350	11,200	7,200	13,200	9,400	11.07	26.94	10.38	20.96
Indiana	780	880	950	1,100	8,400	6,800	6,000	9,000	12.74	15.44	12.17	15.89
Michigan	1,200	1,260	1,750	1,900	10,400	7,700	9,300	10,800	11.72	12.47	9.25	6.87
Minnesota	480	550	670	770	5,200	4,200	4,800	3,000	10.00	10.43	14.38	15.33
New York	4,710	5,680	4,470	5,000	36,600	54,400	33,200	35,800	23.44	16.45	13.19	7.79
Ohio (other)	360	200	280	470	3,100	1,700	1,700	4,900	22.58	15.29	14.12	7.55
Oregon	1,450	1,500	1,590	1,570	12,400	7,800	12,600	14,100	30.65	18.08	15.00	12.48
Pennsylvania	910	920	930	930	7,400	9,200	7,200	6,800	24.46	18.43	25.28	11.18
Utah	270	130	460	280	2,700	2,200	8,000	3,600	15.56	20.91	5.00	16.39
Wisconsin	3,090	4,700	7,000	4,570	38,000	34,300	49,900	23,200	11.37	13.38	8.24	7.97
Total	14,650	16,780	19,900	17,940	135,400	135,500	145,900	120,600	17.49	16.06	11.30	10.52
Danish (late):												
New York	18,020	17,940	19,200	20,750	126,100	143,500	141,800	176,400	26.64	17.46	10.35	5.83
Other States	11,270	14,650	17,450	13,350	121,600	115,700	136,100	78,100	18.75	18.89	7.79	10.74
Total	29,290	32,590	36,650	34,100	247,700	259,200	277,900	254,500	22.77	18.10	9.10	7.34
Late (total)	43,940	49,370	56,550	52,040	383,100	394,700	423,800	375,100	20.90	17.40	9.85	8.36
Total market	105,500	122,210	121,240	127,340	753,300	860,200	787,400	* 859,100	20.23	20.22	21.52	10.42

## FOR SAUERKRAUT

New York	5,400	6,000	9,000	5,800	40,500	57,000	73,800	51,000	12.60	10.60	6.55	5.10
Ohio	2,250	2,700	3,300	2,200	19,600	23,200	19,100	18,900	7.10	7.15	7.20	5.60
Indiana	780	1,080	1,400	1,260	7,800	5,900	9,000	6,800	7.85	7.85	7.30	7.10
Illinois	670	670	800	550	6,200	5,000	6,200	1,600	12.40	15.10	10.00	10.60
Michigan	1,620	1,700	2,080	1,420	13,000	10,700	13,400	10,800	7.20	7.90	7.35	5.80
Wisconsin	4,000	5,500	7,200	5,000	41,200	47,300	61,200	28,500	8.20	11.00	8.50	6.20
Minnesota	430	500	540	380	4,600	4,000	4,200	2,800	7.00	7.00	7.00	6.70
Colorado	500	500	500	250	7,000	5,000	5,800	2,400	7.00	15.20	7.00	6.40
Washington	260	320	320	200	2,200	2,900	2,900	1,700	10.00	10.00	10.00	12.80
Other States	1,400	1,640	2,660	1,610	12,000	12,800	15,600	10,200	12.87	11.13	10.35	8.43
U. S. total	17,260	20,610	27,750	18,670	153,600	173,800	211,200	133,700	9.54	10.21	7.77	6.03

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and sauerkraut manufacturers.

<sup>1</sup>Short ton.<sup>2</sup>Season begins in fall of previous year.<sup>3</sup>Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.<sup>4</sup>Other States include Arkansas, California, Iowa, Maryland, Montana, Missouri, Nebraska, Oregon, Pennsylvania, Tennessee, Utah, and Virginia.

## STATISTICS OF FRUITS AND VEGETABLES

703

TABLE 188.—Cabbage: Car-lot shipments, by State of origin, 1920-1930

State	Crop-movement season <sup>1</sup>										
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930 <sup>2</sup>
	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars
New York <sup>3</sup>	9,511	9,315	10,274	9,086	11,816	12,545	12,898	14,080	8,636	10,609	11,917
Pennsylvania <sup>3</sup>	240	300	406	317	409	552	523	420	252	302	216
Ohio	524	318	539	538	658	414	544	765	581	555	66
Illinois	157	107	144	289	279	198	195	193	329	296	355
Michigan <sup>3</sup>	898	477	908	732	644	573	277	875	428	258	153
Wisconsin	4,766	2,908	5,875	6,415	4,955	5,409	5,177	4,547	6,412	5,395	5,939
Minnesota	895	592	1,192	989	1,552	873	1,125	1,009	1,493	1,200	653
Iowa	373	150	506	390	541	265	459	455	586	442	504
Maryland	219	325	448	220	509	238	196	258	266	423	67
Virginia <sup>4</sup>	1,545	3,628	2,937	3,326	3,400	2,328	1,814	2,729	2,444	3,969	1,772
North Carolina	49	251	222	364	275	356	341	292	284	261	214
South Carolina <sup>4</sup>	904	3,247	3,235	4,299	1,530	3,421	2,671	1,900	2,209	2,549	2,731
Florida <sup>4</sup>	4,681	1,617	2,998	1,173	3,842	1,936	1,667	1,051	1,188	3,136	2,271
Kentucky	112	103	73	85	107	45	17	24	83	75	25
Tennessee	136	181	563	270	348	609	667	823	1,256	952	925
Alabama	370	1,001	1,364	1,564	908	1,270	1,558	1,803	801	857	676
Mississippi	878	509	1,629	1,134	605	674	990	710	1,249	1,689	931
Louisiana <sup>4</sup>	254	313	334	456	108	644	331	592	592	549	265
Texas <sup>4</sup>	5,180	1,847	4,049	1,356	7,281	4,048	6,093	5,543	7,242	7,905	5,347
Colorado	1,832	2,523	1,904	3,174	1,473	1,432	1,274	683	1,162	810	1,164
Washington	114	170	104	155	52	108	154	139	82	193	85
California <sup>4</sup>	1,485	788	835	684	364	650	663	860	798	512	837
Other States	364	357	520	478	430	836	791	727	847	913	1,014
Total	35,096	30,927	41,229	37,488	42,081	39,024	40,378	39,331	38,727	44,131	35,204

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

<sup>1</sup> Crop-movement season covers 17 months, from December through the second following April; i. e., the 1920 season begins December, 1919, and ends April, 1921.

<sup>2</sup> Preliminary.

<sup>3</sup> Figures include shipments in May of succeeding crop year as follows: N. Y., 1922, 1 car; 1926, 3 cars; 1927, 25 cars; 1930, 1 car; Pa., 1920, 1 car; Mich., 1927, 1 car; 1928, 2 cars.

<sup>4</sup> Figures include shipments in November of preceding crop year as follows: Virginia, 1922, 1 car; 1925, 7 cars; 1928, 1 car; 1930, 1 car; South Carolina, 1923, 1 car; 1923, 11 cars; 1925, 8 cars; 1927, 10 cars; 1928, 23 cars; 1929, 3 cars; 1930, 130 cars; Florida, 1928, 6 cars; Louisiana, 1923, 2 cars; 1924, 1 car; Texas, 1920, 2 cars; 1922, 4 cars; 1923, 22 cars; 1924, 9 cars; 1925, 12 cars; 1928, 30 cars; 1929, 12 cars; 1930, 10 cars; California, 1920, 24 cars; 1921, 6 cars; 1922, 64 cars; 1923, 1 car; 1924, 2 cars; 1926, 2 cars; 1930, 1 car.

TABLE 189.—Cantaloupes: <sup>1</sup> Car-lot shipments, by State of origin, 1920-1931

State	Crop-movement season <sup>1</sup>											
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931 <sup>2</sup>
	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars
Indiana	632	644	894	681	822	1,089	629	415	465	589	194	277
Michigan	209	232	465	306	114	145	84	77	62	16	13	16
Delaware	600	942	543	818	511	657	551	427	427	285	198	233
Maryland	781	1,153	1,233	1,270	699	1,116	1,283	1,159	1,002	561	274	335
North Carolina	358	894	700	620	401	655	401	606	804	98	19	110
South Carolina	181	281	270	70	116	93	173	179	94	44	140	89
Georgia	387	619	1,632	217	586	117	136	108	104	76	39	88
Arkansas	998	1,554	1,002	337	1,052	1,245	1,127	788	844	176	358	753
Texas	169	166	186	387	456	498	514	242	242	176	358	753
Colorado	2,452	3,288	4,420	2,306	3,229	3,837	5,105	3,980	2,789	4,664	6,082	2,773
New Mexico	908	508	275	364	518	574	640	415	370	352	416	612
Arizona	1,159	1,604	1,558	1,208	2,145	3,833	3,712	5,217	5,901	5,467	5,834	5,642
Washington	380	208	871	207	298	221	145	252	253	282	282	150
California <sup>4</sup>	13,251	13,186	15,304	16,486	18,930	18,707	18,320	22,406	25,307	26,850	28,625	27,673
Other States	460	606	777	646	617	1,091	601	486	528	289	384	423
Total	22,953	25,816	29,930	25,923	31,494	33,819	33,424	36,757	38,694	40,042	36,179	36,520

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

<sup>1</sup> Includes Honeydew and other miscellaneous melons. Melons other than cantaloupes were not reported separately until 1923. Shipments are as follows: 1923, 1,162 cars; 1924, 2,565 cars; 1925, 3,654 cars; 1926, 6,484 cars; 1927, 6,516 cars; 1928, 9,719 cars; 1929, 11,894 cars; 1930, 12,352 cars; 1931, 12,169 cars.

<sup>2</sup> Crop-movement season extends from Apr. 1 through November of a given year.

<sup>3</sup> Preliminary.

<sup>4</sup> Figures for California include shipments in December as follows: 1920, 1 car; 1925, 18 cars; 1926, 3 cars; 1927, 4 cars; 1928, 2 cars; 1930, 1 car.

TABLE 190.—*Cantaloupes,<sup>1</sup> commercial crop: Acreage, production, and price per crate, by States, 1928-1931*

Group and State	Acreage				Production				Seasonal farm price per crate			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Early:												
California (Imperial).....	<i>Acres</i> 33,460	<i>Acres</i> 33,360	<i>Acres</i> 50,900	<i>Acres</i> 51,640	<i>1,000 crates<sup>2</sup></i> 6,224	<i>1,000 crates<sup>2</sup></i> 6,713	<i>1,000 crates<sup>2</sup></i> 5,752	<i>1,000 crates<sup>2</sup></i> 7,849	<i>Dolls.</i> 1.60	<i>Dolls.</i> 1.63	<i>Dolls.</i> 1.32	<i>Dolls.</i> 1.14
Florida.....	920	600	600	250	37	36	30	19	2.00	2.00	1.75	1.50
Texas.....	140	740	1,260	540	16	70	113	53	1.20	2.00	2.25	.81
Group total.....	34,520	39,700	52,760	52,430	6,277	6,819	5,895	7,921	1.60	1.64	1.34	1.14
Second early:												
Arizona.....	10,000	11,500	15,700	13,000	1,800	2,024	2,088	1,625	1.34	1.25	.90	.85
Arkansas.....	6,000	2,400	2,550	2,600	564	185	115	182	1.02	1.22	.90	.88
California (other).....	12,050	14,020	15,330	15,680	2,470	2,734	2,851	2,540	1.06	.95	.99	.87
Georgia.....	650	600	750	800	52	48	75	56	1.50	2.22	.80	.75
Nevada.....	250	170	150	120	60	23	14	20	.80	1.30	1.70	.84
North Carolina.....	2,310	1,000	620	1,100	261	70	53	99	.98	1.20	1.15	.70
Oklahoma.....	500	500	500	750	34	38	38	64	.89	1.25	1.10	.68
South Carolina.....	640	510	600	1,200	56	25	72	150	1.31	1.90	.75	.65
Texas (other).....	1,570	1,500	2,320	11,530	141	111	139	* 865	.50	1.16	.85	.81
Group total.....	33,970	32,200	38,520	46,780	5,428	5,259	5,445	* 5,601	1.13	1.10	.95	.84
Intermediate:												
Delaware.....	2,400	2,400	2,400	2,760	324	240	144	317	1.00	1.50	1.70	.75
Illinois.....	900	900	900	1,020	97	94	63	82	1.20	1.45	1.75	1.25
Indiana.....	4,640	4,150	4,390	4,610	524	418	255	438	1.23	1.50	1.55	1.15
Maryland.....	6,040	6,800	7,010	8,150	678	573	386	734	1.21	1.45	1.55	.75
New Mexico.....	1,400	1,570	2,100	2,100	189	198	243	258	1.10	1.00	1.60	1.17
Tennessee.....	470	120	170	220	33	10	13	15	.05	1.50	1.60	1.35
Washington.....	1,750	1,850	1,950	1,600	192	273	224	197	.61	.76	1.13	.75
Group total.....	17,600	17,820	18,620	20,460	2,035	1,814	1,328	2,041	1.11	1.31	1.60	.91
Late:												
Colorado.....	9,000	11,000	10,000	8,100	1,170	2,530	2,000	1,134	.94	.83	1.20	.85
Iowa.....	780	580	520	620	78	39	42	53	1.06	1.48	1.40	1.05
Kansas.....	450	450	450	450	57	54	40	50	.92	.81	1.05	.80
Michigan.....	3,000	3,400	3,800	4,000	300	478	608	560	1.35	1.35	1.60	1.20
Nevada.....	220	320	280	100	36	40	44	3	1.70	1.75	.65	.65
New Jersey.....	3,000	2,500	3,100	4,000	480	275	388	420	.95	1.25	1.25	1.00
Ohio.....	300	300	360	540	27	41	57	-----	1.75	1.85	1.09	.75
Oregon.....	600	800	800	700	-----	60	120	122	-----	1.00	1.25	.75
Group total.....	16,450	19,150	19,810	18,510	2,121	3,501	3,283	2,399	1.02	.96	1.28	.96
Total all States.....	102,540	108,870	129,210	138,180	15,861	17,393	15,951	* 17,962	1.30	1.31	1.21	1.00

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

<sup>1</sup>Includes Honeyball, Honeydew, Casaba, and Persian melons not separately reported.<sup>2</sup>Standard crates (45's) containing approximately 60 pounds.<sup>3</sup>Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.TABLE 191.—*Carrots, commercial crop for market: Acreage, production, and price per bushel, 1928-1931*

Marketing group	Acreage				Production				Seasonal farm price to Dec. 1, per bushel			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Fall.....	<i>Acres</i> 1,840	<i>Acres</i> 2,900	<i>Acres</i> 3,950	<i>Acres</i> 4,340	<i>1,000 bush.<sup>1</sup></i> 861	<i>1,000 bush.<sup>1</sup></i> 1,595	<i>1,000 bush.<sup>1</sup></i> 2,267	<i>1,000 bush.<sup>1</sup></i> 2,543	<i>Cents</i> 63	<i>Cents</i> 70	<i>Cents</i> 70	<i>Cents</i> 60
Early.....	6,450	7,540	7,810	8,280	1,384	1,685	1,438	* 2,123	48	31	35	41
Second early.....	6,270	8,730	7,650	10,680	2,184	* 3,514	3,093	* 4,484	67	62	76	52
Intermediate.....	2,490	2,300	2,180	1,710	525	538	* 708	* 573	95	98	91	79
Late.....	5,070	5,350	6,390	5,400	1,209	2,693	3,158	2,110	96	58	40	45
Total.....	20,120	26,720	27,950	30,340	6,103	* 10,225	* 10,662	* 11,833	70	58	59	53

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

<sup>1</sup>Bushels containing approximately 50 pounds.<sup>2</sup>Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

TABLE 192.—*Carrots: Car-lot shipments by State of origin, 1920-1930*

State	Crop-movement season <sup>1</sup>										
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930 <sup>2</sup>
	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>
New York.....	1, 158	1, 247	1, 523	1, 410	2, 262	1, 825	1, 845	2, 430	1, 484	2, 111	2, 233
New Jersey.....	32	32	26	34	18	45	44	85	67	12	14
Illinois.....	53	82	82	24	3	23	2	13	96	33	37
Michigan.....	11	83	25	35	55	54	77	91	208	204	141
Virginia.....	3	1	10	2	1	40	10	44	137	110	28
Mississippi.....	77	81	304	142	266	197	209	496	230	108	67
Louisiana.....	28	43	62	58	32	106	70	177	99	71	84
Texas.....	5	198	48	65	282	575	1, 136	903	1, 685	2, 860	2, 145
Colorado.....	1	9	4	12	26	29	62	10	216	68	43
California.....	111	19	21	24	157	278	557	2, 363	2, 938	6, 095	7, 206
Other States.....	123	115	151	173	212	252	290	241	295	449	439
Total.....	1, 602	1, 840	2, 256	1, 979	3, 314	3, 427	4, 302	6, 853	7, 455	12, 149	12, 437

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

<sup>1</sup> Crop-movement season begins in October of the previous year in such early shipping States as California, Louisiana, and Texas, and extends through June of the following year in order to include shipments from storage in Northern States and to have totals comparable with acreage and production figures.

<sup>2</sup> Preliminary.

<sup>3</sup> Includes 45 cars in July, 1931.

TABLE 193.—*Celery, commercial crop: Acreage, production, and price per crate, 1928-1931*

Marketing group	Acreage				Production				Seasonal farm price to Dec. 1, per crate			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>1,000 crates</i>	<i>1,000 crates</i>	<i>1,000 crates</i>	<i>1,000 crates</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
Fall and winter.....	7, 400	7, 000	7, 620	7, 060	999	1, 512	1, 257	1, 278	1. 09	1. 08	1. 00	1. 04
Early.....	6, 580	7, 620	7, 800	7, 590	2, 753	2, 877	3, 243	3, 107	2. 69	2. 14	2. 00	2. 37
Second early.....	450	850	800	1, 100	264	604	616	610	1. 64	2. 28	1. 60	1. 86
Intermediate.....	3, 280	3, 750	3, 210	2, 650	2, 866	1, 046	882	639	1. 75	1. 72	1. 74	1. 75
Late (sec. 1).....	10, 140	11, 320	13, 030	13, 330	2, 864	2, 932	3, 954	3, 638	1. 50	1. 44	1. 12	1. 63
Late (sec. 2).....	1, 210	1, 330	1, 490	1, 630	299	447	467	478	1. 24	1. 69	1. 28	1. 50
Total.....	29, 060	31, 870	33, 940	33, 350	8, 245	9, 418	10, 419	9, 750	1. 88	1. 60	1. 46	1. 82

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

<sup>1</sup> Two-thirds size (New York) crates containing approximately 90 pounds.

TABLE 194.—*Celery: Car-lot shipments, by State of origin, 1920-1930*

State	Crop-movement season <sup>1</sup>										
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930 <sup>2</sup>
	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>
New York.....	3, 110	3, 047	3, 247	3, 742	4, 529	4, 492	4, 898	5, 893	4, 192	3, 847	5, 451
New Jersey.....	94	219	115	219	177	149	138	106	32	53	32
Pennsylvania.....	186	224	212	223	225	208	194	169	71	105	81
Michigan.....	954	1, 081	1, 626	1, 486	1, 332	2, 224	1, 880	1, 997	2, 139	1, 852	1, 806
Florida.....	2, 652	4, 218	4, 964	6, 398	7, 219	7, 952	5, 504	7, 499	8, 415	8, 831	9, 838
Idaho.....	22	9	26	49	28	19	46	161	188	205	287
Colorado.....	805	211	222	125	197	399	211	181	605	673	647
Oregon.....	16	53	82	205	363	398	511	625	834	9, 580	8, 450
California.....	2, 005	3, 469	2, 625	4, 419	4, 745	4, 554	6, 226	7, 696	8, 384	135	69
Other States.....	48	77	102	82	99	109	80	125	135	138	69
Total.....	9, 392	12, 558	13, 211	16, 948	18, 987	20, 514	19, 681	24, 317	24, 280	25, 490	26, 627

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

<sup>1</sup> Crop movement season covers 20 months, from September through the second following April; i. e., the 1920 season begins September, 1919, and ends April, 1921.

<sup>2</sup> Preliminary.

TABLE 195.—Cherries: Production in 10 States,<sup>1</sup> imports, and exports 1924-1931

Year	Production										Imports, year beginning July 1				Exports, canned, year beginning July 1
											in			Total	
	New York	Michigan	Wisconsin	Montana	Idaho	Colorado	Utah	Washington	Oregon	California	10 States	Natural, brine	Prepared or preserved		
	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.
1924	17,500	16,500	9,550	265	1,700	750	3,800	4,800	10,400	13,500	78,765	4,937	9,175	14,112	1,612
1925	15,300	11,600	3,550	310	2,400	3,900	5,500	8,400	7,200	12,000	70,160	2,904	11,153	14,057	1,688
1926	16,400	13,800	9,700	385	3,200	7,600	5,300	10,500	15,100	20,000	101,985	5,733	15,974	21,707	2,111
1927	10,500	6,800	3,150	350	1,300	4,500	3,800	4,100	11,300	12,000	57,800	15,136	1,048	16,184	1,719
1928	9,600	21,500	10,250	130	3,100	1,650	4,600	9,700	11,600	18,500	90,530	13,173	384	13,557	2,202
1929	14,670	15,750	4,600	720	3,100	5,100	3,200	15,550	8,500	16,300	87,490	22,362	866	23,228	1,897
1930	25,000	21,100	5,200	560	3,200	3,500	3,500	16,500	12,640	17,500	108,700	7,926	1,280	9,206	1,232
1931 <sup>1</sup>	17,000	22,500	6,000	590	3,000	2,500	2,000	10,000	9,000	23,000	95,590				

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board. Trade figures compiled from Monthly Summary of Foreign Trade of the United States, June issues. Estimates of production for 1929 and 1930 revised on basis of 1930 Census. Earlier years not so revised.

<sup>1</sup> Estimates include only certain States where total production can be calculated from commercial sales (shipments, canning, cold pack, etc.) and differs from previously published commercial estimates for some States by an increased allowance for farm and local use.

<sup>2</sup> Fresh cherries not separately reported.

<sup>3</sup> Preliminary.

TABLE 196.—Citrus-fruit production, by States, 1899, 1909, 1919-1931<sup>1</sup>

Year	Oranges							Grapefruit					Lemons	Limes	
	7 States	California	Florida *	Texas	Arizona	Alabama *	Louisiana	Mississippi	4 States	California	Florida *	Texas	Arizona	California	Florida
1899 <sup>1</sup>	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes
1899 <sup>2</sup>	6,167	5,882	273	-----	11	(5)	1	-----	31	18	12	-----	1	874	-----
1909 <sup>3</sup>	19,530	14,440	4,888	11	83	1	152	5	1,186	123	1,062	(9)	1	2,756	11
1919	22,842	15,265	7,400	9	80	20	37	31	6,095	263	5,800	3	29	3,499	28
1920	30,005	21,296	8,500	-----	60	82	42	25	5,738	304	5,400	-----	34	4,955	-----
1921	20,582	12,640	7,700	-----	80	82	50	30	6,795	360	6,400	-----	35	4,050	-----
1922	30,671	20,106	10,200	4	81	175	60	45	8,073	394	7,600	35	44	3,400	-----
1923	37,494	24,137	12,900	6	88	225	75	55	8,893	363	8,400	65	65	6,732	-----
1924	29,847	18,100	11,600	12	60	(5)	75	0	9,265	387	8,600	211	67	5,125	30
1925	33,623	24,200	9,100	10	86	100	100	27	8,190	600	7,300	200	90	7,316	30
1926	39,229	28,167	10,700	20	75	75	150	42	8,865	650	7,800	340	75	7,712	12
1927	31,644	23,000	8,200	30	54	110	200	50	8,588	720	7,200	490	176	6,000	0
1928	54,160	38,705	15,000	68	99	88	220	30	12,455	972	10,500	772	211	7,900	6
1929	34,034	24,400	8,800	261	137	212	187	37	11,095	1,000	8,200	1,530	365	5,900	8
1930	54,558	35,000	19,000	220	139	3	195	2	18,090	1,250	16,000	1,040	400	7,950	8
1931 <sup>4</sup>	50,814	34,900	15,000	400	145	70	245	84	14,770	1,400	11,000	1,920	450	8,000	9

Bureau of Agricultural Economics. Estimates of production for 1929 and 1930 revised on basis of 1930 Census. Earlier years not so revised.

<sup>1</sup> The figures in this table of production include fruit consumed on farms, sold locally and used for manufacturing purposes, as well as that shipped. The figures do not include fruit which ripened on the trees, but which was destroyed by freezing or storms prior to picking. For California the figures relate to the crop produced from the bloom of the year shown, fruiting through the winter and through the spring and summer of the following year, being picked from Nov. 1 of the year shown to Oct. 31 of the following year. Fruit not picked until after the latter date is included with the crop of the following year. For all States except California the estimates include all fruit picked after about Sept. 1 of the year shown. The estimates for oranges include tangerines.

<sup>2</sup> From prospects on Dec. 1, commercial shipments of Florida citrus fruits from the 1931 crop were estimated at 12,500,000 boxes of oranges, and 8,000,000 boxes of grapefruit, compared with 16,000,000 boxes of oranges and 11,200,000 boxes of grapefruit shipped from the 1930 crop.

<sup>3</sup> For years 1919-1931, equivalent in standard boxes, each equal to about 2 of the "half straps" commonly used.

<sup>4</sup> Census. Size of boxes not specified.

<sup>5</sup> 500 boxes or less.

<sup>6</sup> As estimated from prospects on Dec. 1.

## STATISTICS OF FRUITS AND VEGETABLES

707

TABLE 197.—*Citrus fruits: Car-lot shipments, by State of origin, 1921-22 to 1930-31*  
ORANGES<sup>1</sup>

State	Crop-movement season <sup>2</sup>									
	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31 <sup>3</sup>
	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>
California.....	28,376	48,346	44,905	34,439	47,017	53,511	43,693	68,797	43,058	64,432
Florida.....	15,718	23,006	33,418	25,091	19,625	22,536	16,463	32,480	17,312	33,884
Alabama.....	145	476	600	2	338	179	312	97	465	2
Mississippi.....		9	13		8	4	15	5	25	1
Louisiana.....			3	2	1	1	251	264	278	155
Texas.....			3	3	6	9	26	33	156	119
Arizona.....	78	71	94	45	96	73	33	66	90	90
Total.....	44,317	71,908	79,036	59,582	67,091	76,313	60,783	101,742	61,399	98,653

## GRAPEFRUIT

Florida.....	12,943	16,969	19,614	20,087	14,269	17,304	14,166	21,839	13,955	26,072
Texas.....	8	48	99	521	298	747	1,036	1,617	3,493	2,247
California.....	508	507	409	449	546	597	756	822	1,179	1,108
Arizona.....	62	103	155	159	218	210	211	272	417	436
Louisiana.....									1	2
Total.....	13,516	17,627	20,337	21,216	15,331	18,858	16,169	24,550	19,045	29,860

## LEMONS

California.....	9,907	8,946	13,388	11,680 <sup>4</sup>	13,981	13,496	12,745	17,181	13,561	18,396
Texas.....			1	2						
Arizona.....		1	2	1	1				2	1
Total.....	9,907	8,947	13,391	11,683	13,982	13,496	12,745	17,181	13,566	18,397

MIXED CITRUS<sup>5</sup>

Florida.....		2,631	3,608	4,226	3,565	5,313	6,225	9,109	8,216	14,683
California.....		1,033	1,461	1,143	1,605	1,639	1,590	1,783	1,843	1,618
Texas.....		18	1	18		22	92	185	501	288
Arizona.....		3		10	1	10	11	24	48	29
Louisiana.....							1	1	10	155
Total.....		3,685	5,070	5,402	5,171	6,964	7,919	11,162	10,118	16,773

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

<sup>1</sup> Include tangerines.

<sup>2</sup> Crop-movement season extends as follows: California, from Nov. 1 through October of the following year, except for grapefruit which extends from Sept. 1 through August of the following year; all other States from Sept. 1 through August of the following year, except for lemons, from Nov. 1 through October of the following year.

<sup>3</sup> Preliminary.

<sup>4</sup> Includes 1 car in August, 1921.

<sup>5</sup> Reported in October, 1924.

<sup>6</sup> No reports available before 1922.

TABLE 198.—*Lemons: International trade, average 1925-1929, annual 1927-1930*

Country	Calendar year									
	Average, 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
<b>PRINCIPAL EXPORTING COUNTRIES</b>	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes	1,000 boxes
Italy.....	6,971	0	7,345	0	6,809	0	6,817	0	8,036	0
Spain.....	474	0	383	0	340	0	618	0	690	0
Total.....	7,445	0	7,728	0	6,949	0	7,435	0	8,726	0
<b>PRINCIPAL IMPORTING COUNTRIES</b>										
United Kingdom.....	0	1,857	0	1,827	0	1,655	0	1,965	0	2,171
Germany <sup>2</sup> .....	24	1,682	29	1,741	28	1,665	23	1,859	28	2,168
United States.....	287	999	308	849	251	943	267	634	206	1,056
Belgium <sup>3</sup> .....	4	456	4	95	4	90	5	1,173	7	2,137
Czechoslovakia.....	0	436	0	433	0	382	0	459	0	480
Canada.....	0	351	0	352	0	335	0	370	0	379
Poland.....	0	297	0	308	0	288	0	351	0	263
Rumania.....	0	220	0	235	0	170	0	188	0	222
Netherlands.....	28	182	29	187	35	170	36	158	34	238
Hungary.....	0	172	0	216	0	202	0	196	0	197
Switzerland.....	0	154	0	163	0	165	0	167	0	205
Yugoslavia.....	0	139	0	147	0	144	0	135	0	175
Total.....	313	6,945	370	6,593	318	6,089	331	7,497	275	9,457

Bureau of Agricultural Economics. Official sources.

<sup>1</sup> Preliminary.<sup>2</sup> Includes oranges and similar fruits in exports.<sup>3</sup> Includes oranges and similar fruits, except for imports for 1927 and 1928.<sup>4</sup> 3-year average.TABLE 199.—*Lemons, California: Weighted average auction price per box, New York, by months, 1924-25 to 1931-32*

Crop year	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Average
	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1924-25.....			4.47	4.45	4.59	4.75	5.73	6.84	4.66	4.67	8.55	6.83	-----
1925-26.....	4.13	4.46	3.91	4.16	5.40	4.12	4.83	3.79	4.53	4.38	3.56	4.80	4.35
1926-27.....	3.82	4.03	4.20	3.43	3.90	3.50	3.89	4.50	6.44	6.37	8.82	9.27	4.64
1927-28.....	6.92	6.13	6.33	6.03	5.19	5.54	6.42	6.04	6.97	6.11	5.59	5.19	6.07
1928-29.....	4.90	5.62	5.26	3.95	4.07	4.55	3.82	6.89	5.39	7.82	11.87	11.22	5.52
1929-30.....	8.70	8.63	5.68	5.06	4.81	5.51	7.24	6.15	7.26	7.93	5.36	4.23	6.42
1930-31.....	4.18	4.52	4.89	4.08	4.47	4.06	4.43	5.05	6.57	6.55	7.28	5.66	5.30
1931-32.....	3.98	4.04	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Compiled from reports of California Fruit Growers Exchange. Prices weighted by number of boxes sold. These prices are a new series and are not comparable with those published in Yearbooks prior to 1930.

TABLE 200.—*Grapefruit, Florida: Weighted average auction price per box, New York, by months, 1924-25 to 1931-32*

Crop season	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Average
	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1924-25.....				2.83	2.83	2.71	3.78	4.38	5.94	(1)	-----
1925-26.....	4.96	3.97	3.95	4.01	4.03	4.61	5.16	4.70	4.74	5.51	4.38
1926-27.....	5.35	4.07	3.40	3.58	3.75	3.67	3.59	3.66	3.80	2.44	3.66
1927-28.....	4.60	4.70	4.71	4.82	5.07	5.52	5.45	4.92	3.93	6.28	4.93
1928-29.....	4.41	4.25	3.44	3.52	3.20	3.30	3.32	3.83	4.71	6.36	3.70
1929-30.....	4.51	4.23	4.26	4.43	4.09	4.78	5.09	4.25	3.24	3.10	4.42
1930-31.....	3.64	3.00	2.82	2.56	2.43	2.50	2.78	2.57	2.06	1.17	2.69
1931-32.....	3.09	2.60	2.26	-----	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Compiled from reports of California Fruit Growers Exchange. Prices weighted by number of boxes sold. These prices are a new series and are not comparable with those published in Yearbooks prior to 1930.

<sup>1</sup> Reported for one week only.<sup>2</sup> Includes a price in August, 1928, of \$4.51.<sup>3</sup> Includes a price in September, 1929, of \$5.80.<sup>4</sup> Includes a price in September, 1930, of \$4.03.

TABLE 201.—Oranges: *International trade, average 1925-1929, annual 1927-1930*

Country	Calendar year									
	Average 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
<b>PRINCIPAL EXPORTING COUNTRIES</b>	<i>1,000 boxes</i>	<i>1,000 boxes</i>	<i>1,000 boxes</i>	<i>1,000 boxes</i>	<i>1,000 boxes</i>	<i>1,000 boxes</i>	<i>1,000 boxes</i>	<i>1,000 boxes</i>	<i>1,000 boxes</i>	<i>1,000 boxes</i>
Spain.....	20,935	1	17,538	0	24,283	3	22,407	1	30,654	0
Italy.....	3,435	0	4,410	0	2,245	0	2,608	0	3,744	0
United States.....	3,285	14	3,502	19	2,678	24	5,512	0	2,226	0
Palestine.....	<sup>2</sup> 2,123	0	2,645	0	2,151	0	1,813	0	2,998	0
Union of South Africa.....	734	0	749	0	694	0	1,002	0	1,763	0
Brazil.....	571	0	397	0	605	0	1,098	0	1,076	0
Japan.....	449	0	479	0	464	0	440	0	878	0
Cuba.....	120	0	33	0	0	0	0	0	9	0
<b>Total.....</b>	<b>31,652</b>	<b>15</b>	<b>29,813</b>	<b>19</b>	<b>33,105</b>	<b>27</b>	<b>34,878</b>	<b>1</b>	<b>42,858</b>	<b>0</b>
<b>PRINCIPAL IMPORTING COUNTRIES</b>										
United Kingdom.....	0	11,307	0	10,975	0	10,753	0	12,859	0	13,774
Germany.....	0	0,259	0	5,941	0	7,340	0	6,741	0	9,946
France <sup>3</sup> .....	81	3,793	57	3,068	108	4,008	21	3,700	28	5,851
Canada.....	0	2,237	0	2,844	0	2,212	0	3,128	0	2,163
Netherlands.....	591	1,833	527	1,631	666	1,938	743	2,027	821	2,581
Belgium.....		829		671		947				
China.....	292	462	313	461	332	416	353	549	328	315
Switzerland.....	0	440	0	419	0	494	0	476	0	652
Czechoslovakia.....	0	416	0	417	0	384	0	390	0	791
Norway <sup>2</sup> .....	0	391	0	387	0	426	0	434	0	549
Sweden.....	0	357	0	360	0	399	0	440	1	747
Egypt.....	4	345	3	394	5	250	5	264	5	332
Hungary.....	0	293	0	351	0	300	0	296	0	414
Poland.....	0	256	0	210	0	134	0	123	1	146
Irish Free State.....	0	235	0	255	0	258	0	282	0	326
Denmark.....	0	234	0	221	0	244	0	242	0	308
Yugoslavia.....	0	161	0	163	0	179	0	180	0	253
<b>Total.....</b>	<b>968</b>	<b>29,868</b>	<b>900</b>	<b>29,071</b>	<b>1,109</b>	<b>30,742</b>	<b>1,122</b>	<b>32,131</b>	<b>1,182</b>	<b>39,198</b>

Bureau of Agricultural Economics. Official sources.

<sup>1</sup> Preliminary.<sup>2</sup> 4-year average.<sup>3</sup> Includes some lemons.<sup>4</sup> 3-year average.TABLE 202.—Oranges, California, Navel: *Weighted average auction price per box, New York, by months, 1924-25 to 1931-32*

Crop season	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
1924-25.....			4.64	4.47	5.35	5.48	6.51	6.21	
1925-26.....	8.00	4.56	4.24	4.55	4.70	5.50	4.73	5.56	4.80
1926-27.....	6.32	5.06	4.69	4.71	4.54	4.89	4.43	5.60	4.74
1927-28.....	(1)	5.55	4.56	5.18	5.52	5.98	7.39		
1928-29.....	5.72	4.40	4.84	3.89	3.52	4.06	3.56	3.56	4.10
1929-30.....	(1)	5.56	4.98	4.99	5.67	6.03	6.64		
1930-31.....	5.23	3.58	3.46	3.27	3.42	3.32	3.93	(1)	
1931-32.....	3.87	3.30							

Bureau of Agricultural Economics. Compiled from reports of California Fruit Growers Exchange. Prices weighted by number of boxes sold. These prices are a new series and are not comparable with those published in Yearbooks prior to 1930.

<sup>1</sup> Reported for 1 week only.

TABLE 203.—*Oranges, California Valencia: Weighted average auction price per box, New York, by months, 1925-1931*

Crop season	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Average <sup>1</sup>
	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
1925-----	4.80	6.28	7.43	6.40	6.47	7.58	8.23	9.90	7.15
1926-----	4.92	4.58	4.40	5.21	4.89	5.39	6.44	6.79	5.28
1927-----	4.66	4.43	4.08	5.90	6.15	6.73	7.02	6.71	0.00
1928-----	5.94	7.38	7.22	7.58	7.45	7.77	7.53	6.79	7.45
1929-----	( <sup>2</sup> )	4.40	4.58	4.13	4.85	4.73	4.85	4.77	4.63
1930-----	6.59	7.97	7.19	7.36	7.33	7.29	8.69	7.78	7.59
1931-----		3.42	3.62	4.31	3.81	3.86	4.50	3.79	-----

Bureau of Agricultural Economics. Compiled from reports of California Fruit Growers Exchange. Prices weighted by number of boxes sold. These prices are a new series and are not comparable with those published in Yearbooks prior to 1930.

<sup>1</sup> Includes prices in December as follows: 1925, \$2.14; 1926, \$6.69; 1927, \$5.75; 1929, \$4.85.

<sup>2</sup> Reported for 1 week only.

TABLE 204.—*Oranges, Florida: Weighted average auction price per box, New York, by months, 1924-25 to 1931-32*

Crop season	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average <sup>1</sup>
	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
1924-25-----				3.68	4.26	5.69	6.43	7.82	8.26	-----
1925-26-----	7.45	7.19	4.00	4.25	4.44	5.02	5.80	5.87	6.72	5.10
1926-27-----	3.70	4.79	3.53	3.76	3.91	4.10	4.80	4.75	4.54	4.11
1927-28-----	3.67	6.31	5.59	5.23	5.97	6.29	6.54	8.58	9.11	6.24
1928-29-----	5.08	3.71	3.55	3.45	3.30	3.30	3.55	3.33	2.99	3.40
1929-30-----	3.42	4.04	4.21	4.49	4.44	4.98	7.13	7.42	6.00	4.94
1930-31-----	4.76	3.45	3.01	2.91	3.19	3.79	3.80	3.85	4.02	3.54
1931-32-----	2.64	3.20	3.11							-----

Bureau of Agricultural Economics. Compiled from reports of California Fruit Growers Exchange. Prices weighted by number of boxes sold. These prices are a new series and are not comparable with those published in Yearbooks prior to 1930.

<sup>1</sup> Includes prices in other months as follows: 1926-27, \$3.12 in July; 1928-29, \$2.92 in July, and \$2.29 in August; 1930-31, \$2.61 in Sept., 1930, and \$4.62 in July, 1931.

TABLE 205.—*Corn, sweet, commercial crop for manufacture: Acreage, production, and price per ton,<sup>1</sup> by States, 1928-1931*

State	Acreage				Production				Seasonal farm price per ton			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Tons</i>	<i>Tons</i>	<i>Tons</i>	<i>Tons</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
Maine-----	10,770	14,850	13,200	10,200	30,200	48,000	48,800	35,700	24.70	24.70	26.30	19.30
New Hampshire--	1,110	1,320	1,050	900	2,600	3,300	3,200	2,600	23.70	23.50	23.10	18.40
Vermont-----	1,940	2,370	2,100	1,280	4,700	6,200	4,800	3,200	18.30	18.20	17.70	12.40
New York-----	27,000	24,600	23,000	17,300	32,400	38,900	29,900	43,200	16.50	17.00	17.50	17.00
Pennsylvania---	4,140	6,000	6,300	5,500	4,100	6,009	5,000	9,400	13.20	15.00	16.00	13.50
Ohio-----	27,910	31,000	32,500	30,300	39,100	62,000	35,800	72,700	10.80	11.20	11.30	9.90
Indiana-----	27,390	38,500	43,500	38,000	38,300	50,000	56,600	83,600	13.00	13.00	13.20	11.00
Illinois-----	58,300	64,000	72,000	68,600	128,300	134,400	144,000	184,600	12.70	12.80	13.00	10.80
Michigan-----	8,930	6,400	7,300	6,900	16,100	6,400	4,400	7,600	12.40	12.60	13.00	11.70
Wisconsin-----	14,780	11,600	13,000	12,500	29,600	24,400	31,200	28,800	11.50	11.80	11.10	10.10
Minnesota-----	33,000	45,800	64,000	48,700	85,800	109,900	129,000	88,100	10.80	11.00	10.40	10.10
Iowa-----	39,860	50,000	55,000	53,800	99,600	125,000	110,000	122,700	9.30	9.90	10.50	9.50
Nebraska-----	5,470	5,740	7,750	6,400	9,800	10,900	10,800	10,900	9.40	10.00	10.00	8.70
Delaware-----	4,060	3,900	3,650	3,100	7,800	5,800	6,500	7,800	12.00	13.00	13.00	10.50
Maryland-----	35,500	44,000	34,000	39,800	53,200	61,600	23,800	71,600	14.00	15.00	14.50	11.70
Tennessee-----	2,100	2,400	3,400	3,600	5,800	6,800	6,800	9,000	14.00	14.60	15.10	16.00
Other States <sup>2</sup> ---	2,700	3,530	3,830	3,680	6,500	8,800	8,500	9,400	13.85	13.95	13.95	11.90
U. S. total....	305,960	357,310	375,580	350,560	592,900	704,400	659,700	771,800	12.68	13.14	13.24	11.32

Bureau of Agricultural Economics. Estimates based upon returns from canning establishments.

<sup>1</sup> Tonnage in husk.

<sup>2</sup> Other States include Colorado, Idaho, Kentucky, Missouri, Montana, Oregon, South Dakota, Utah, Washington, and Wyoming.

TABLE 206.—*Corn, canned: Pack<sup>1</sup> in the United States, 1919-1931*

State	Season												
	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases
Maine.....	1,052	1,588	911	1,066	923	1,294	1,693	1,347	806	908	1,521	1,930	1,245
New York.....	1,014	829	584	616	434	749	1,311	1,038	676	666	782	647	1,080
Ohio.....	1,360	1,544	850	1,073	1,390	787	2,375	1,735	846	1,138	1,551	750	1,871
Indiana.....	586	861	709	665	1,208	846	2,223	2,044	703	1,131	1,250	1,272	2,362
Illinois.....	2,225	2,271	1,711	1,939	2,833	2,310	4,030	3,053	1,961	3,017	2,153	3,261	3,788
Wisconsin.....	635	590	576	625	648	888	1,148	843	310	578	547	686	712
Minnesota.....	456	643	573	598	898	1,199	1,541	1,762	1,088	1,648	2,604	2,912	1,835
Iowa.....	2,496	3,246	1,190	1,959	2,332	1,764	4,105	3,361	1,377	2,541	2,909	2,552	3,227
Maryland.....	2,081	2,217	1,130	1,944	2,256	1,707	3,678	2,133	1,493	1,648	1,865	622	1,556
Other States.....	1,045	1,251	629	934	1,134	1,087	2,216	1,753	1,087	1,164	1,306	1,060	1,339
United States...	13,550	15,040	8,843	11,419	14,106	12,131	24,320	19,069	10,347	14,497	17,487	15,692	19,415

Bureau of Agricultural Economics. Compiled from National Canners' Association data, 1919-1929; Bureau of Census, 1927-1929; beginning 1930, Foodstuffs Division, Bureau of Foreign and Domestic Commerce.

<sup>1</sup> Stated in cases of 24 No. 2 cans.

TABLE 207.—*Cranberries: Production and December 1 price, by States, 1926-1931*

State	Production						Price per barrel received by producers					
	1926	1927	1928	1929	1930	1931 <sup>1</sup>	1926	1927	1928	1929	1930	1931
	Bbls.	Bbls.	Bbls.	Bbls.	Bbls.	Bbls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
Massachusetts.....	430,000	370,000	335,000	400,000	370,000	450,000	7.75	12.50	15.00	13.25	10.00	6.00
New Jersey.....	210,000	75,000	138,000	90,000	144,000	142,000	7.00	11.00	13.00	12.00	9.75	5.50
Wisconsin.....	80,000	24,000	50,000	42,000	40,000	45,000	8.00	13.50	16.00	13.50	12.50	7.00
Washington.....	15,600	21,000	22,000	11,000	8,480	9,000	7.80	12.00	13.50	14.25	12.75	7.50
Oregon.....	7,000	6,000	6,000	5,800	8,000	5,000	7.50	10.50	13.50	14.50	13.50	7.50
United States...	743,600	498,000	551,000	548,800	560,480	651,000	7.56	12.28	14.51	13.10	10.15	5.99

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board. Prices are based upon returns from crop reporters.

<sup>1</sup> Preliminary.

TABLE 208.—*Cucumbers, commercial crop: Acreage, production and price per bushel 1928-1931*

Utilization	Acreage				Production				Seasonal farm price per bushel			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	Acres	Acres	Acres	Acres	1,000 bush. <sup>1</sup>	1,000 bush. <sup>1</sup>	1,000 bush. <sup>1</sup>	1,000 bush. <sup>1</sup>	Dolls.	Dolls.	Dolls.	Dolls.
For market.....	41,830	41,200	54,420	52,460	4,456	4,598	3,186	4,781	1.28	1.73	1.10	0.75
For pickles.....	76,790	80,370	117,690	83,220	4,902	4,037	7,656	5,976	.84	.82	.79	.63
Total.....	118,620	121,570	174,110	137,680	9,358	8,635	10,842	10,757	1.05	1.31	.81	.67

Bureau of Agricultural Economics. Estimates based upon return from crop reporters and pickle manufacturers.

<sup>1</sup> Bushels containing approximately 48 pounds.

<sup>2</sup> Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

TABLE 209.—*Figs: Production and value, California, 1922-1931*

Year	Figs, dried			Figs, marketed fresh and canned		
	Production	Seasonal farm price	Farm value	Production	Seasonal farm price	Farm value
	<i>Short tons</i>	<i>Dollars</i>	<i>1,000 dollars.</i>	<i>Short tons</i>	<i>Dollars</i>	<i>1,000 dollars.</i>
1922.....	11,000	120.00	1,320			
1923.....	9,500	90.00	855			
1924.....	8,500	100.00	850	2,135	104.00	222
1925.....	9,600	110.00	1,056	3,075	100.00	308
1926.....	11,350	95.00	1,078	5,100	112.00	571
1927.....	12,000	45.00	540	5,400	100.00	540
1928.....	11,500	45.00	518	6,130	87.00	533
1929.....	17,000	90.00	1,530	7,300	100.00	730
1930.....	21,000	48.00	1,008	7,700	90.00	693
1931 <sup>1</sup> .....	17,000	<sup>2</sup> 37.00	629	6,300	<sup>2</sup> 74.00	466

Bureau of Agricultural Economics.

<sup>1</sup> Preliminary.<sup>2</sup> Seasonal average price to Dec. 1.TABLE 210.—*Grapes: Production, farm price, imports and exports, United States, 1922-1931*

Year	Production			United States seasonal farm price per ton <sup>1</sup>	United States value, basis seasonal farm price <sup>1</sup>	Foreign trade, year beginning July <sup>2</sup>			
	Total, United States	California	Other States			United States domestic exports	United States imports	United States net exports <sup>3</sup>	
								Total	Percent- age of production
	Short tons	Short tons	Short tons	Dollars	Dollars	Short tons	Short tons	Short tons	Per cent
1922.....	1,981,171	1,706,000	275,171	48.09	95,271,520	7,011	16,326	<sup>4</sup> 9,315	-----
1923.....	2,227,395	2,030,000	197,395	31.83	71,009,078	10,128	10,015	193	( <sup>5</sup> )
1924.....	1,777,722	1,535,000	242,722	41.79	74,297,480	10,151	1,608	8,566	0.5
1925.....	<sup>6</sup> 2,202,085	<sup>6</sup> 2,050,000	152,085	32.03	66,115,000	12,134	1,415	10,735	.5
1926.....	<sup>6</sup> 2,438,413	<sup>6</sup> 2,129,000	309,413	26.66	64,604,000	15,366	1,011	14,414	.6
1927.....	<sup>6</sup> 2,605,238	<sup>6</sup> 2,406,000	199,238	26.52	65,332,000	19,410	1,735	17,747	.7
1928.....	<sup>6</sup> 2,671,076	<sup>6</sup> 2,366,000	305,076	19.75	49,740,000	27,819	1,703	26,155	1.0
1929.....	<sup>6</sup> 2,080,045	<sup>6</sup> 1,827,000	253,045	26.88	55,915,000	23,079	2,687	20,448	1.0
1930.....	<sup>6</sup> 2,438,514	<sup>6</sup> 2,181,000	257,514	18.97	44,040,000	24,900	2,856	22,108	.9
1931 <sup>7</sup> .....	<sup>6</sup> 1,582,982	<sup>6</sup> 1,287,000	295,982	22.94	36,081,000	-----	-----	-----	-----

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board. Prices are based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 census. Earlier years not so revised.

<sup>1</sup> For years 1925-1931, the average price for the States reporting price, except California, is used for computing the value of the grape crop in the less important States for which no price is determined. Price and value are based on quantities actually harvested plus a quantity of fruit that was sold but left on the vines in 1930 and 1931.

<sup>2</sup> Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1923-1928; January and June issues, 1927-1931.

<sup>3</sup> Total exports (domestic plus foreign) minus total imports.

<sup>4</sup> Net import equals total imports minus total exports (domestic plus foreign).

<sup>5</sup> Less than 0.05 per cent.

<sup>6</sup> Includes fruit in California not harvested as follows: 138,000 tons in 1925, 15,000 in 1926, 142,000 in 1927, 183,000 in 1928, 433,000 in 1930, and 10,000 in 1931. (See also last sentence of Note 1.)

<sup>7</sup> Preliminary.

TABLE 211.—*Grapes: Car-lot shipments, by State of origin, 1920-1931*

State	Crop-movement season <sup>1</sup>											
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931 <sup>2</sup>
	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>
New York.....	5,904	2,535	7,720	4,312	5,641	3,763	7,242	3,050	3,752	2,841	2,640	4,215
Pennsylvania.....	1,223	390	1,558	847	1,166	589	1,350	699	1,076	879	809	1,282
Michigan.....	5,046	1,292	6,020	4,202	4,680	398	3,081	2,023	1,571	1,746	1,620	525
Iowa.....	104	77	237	217	79	50	176	186	234	369	226	184
Missouri.....	27	4	128	58	101	186	686	108	415	225	316	337
Arkansas.....	14	3	38	33	243	394	1,170	108	998	510	322	313
Washington.....	8	64	47	62	83	191	125	167	235	232	117	94
California.....	28,832	33,344	43,952	55,348	57,695	76,096	64,327	75,925	73,157	59,205	65,185	39,270
Other States.....	152	108	219	257	245	261	433	411	332	395	271	186
Total.....	41,310	37,817	50,919	65,336	69,933	81,878	78,590	82,677	81,770	66,102	70,915	46,406

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car-lots include those by boat reduced to car-lot basis.

<sup>1</sup> Crop movement season extends from June 1 through December of a given year.

<sup>2</sup> Preliminary.

<sup>3</sup> Figures include shipments in succeeding crop year as follows: 1920, January, 1 car; 1921, January, 2 cars; 1922, January, 7 cars; 1923, January, 13 cars; 1924, January, 6 cars; February, 2 cars; 1925, January, 21 cars; 1926, January, 2 cars; February, 1 car; 1927, January, 7 cars; February, 2 cars; 1928, January, 31 cars; February, 8 cars; March, 1 car; 1929, January, 6 cars; 1930, January, 30 cars; February, 1 car.

TABLE 212.—*Grapes: Number of packages of California varieties sold, and weighted seasonal average price, auction sales in 11 markets, <sup>1</sup> 1926-1931*

	Number of packages (crates and lugs)						Average price per package					
	1926 <sup>2</sup>	1927 <sup>3</sup>	1928 <sup>4</sup>	1929 <sup>5</sup>	1930 <sup>6</sup>	1931 <sup>7</sup>	1926	1927	1928	1929	1930	1931
	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Dol-</i>	<i>Dol-</i>	<i>Dol-</i>	<i>Dol-</i>	<i>Dol-</i>	<i>Dol-</i>
	<i>sands</i>	<i>sands</i>	<i>sands</i>	<i>sands</i>	<i>sands</i>	<i>sands</i>	<i>lars</i>	<i>lars</i>	<i>lars</i>	<i>lars</i>	<i>lars</i>	<i>lars</i>
Tokay.....	2,495	2,785	2,762	1,855	2,499	1,591	1.43	1.40	1.34	1.42	1.15	1.59
Emperor.....	333	236	108	56	41	991	1.88	1.15	1.15	1.62	1.06	1.01
Red Malaga.....	( <sup>8</sup> )	( <sup>8</sup> )	( <sup>8</sup> )	113	119	157	( <sup>8</sup> )	( <sup>8</sup> )	( <sup>8</sup> )	2.20	1.79	1.93
Ribier.....	( <sup>8</sup> )	( <sup>8</sup> )	( <sup>8</sup> )	89	152	184	( <sup>8</sup> )	( <sup>8</sup> )	( <sup>8</sup> )	1.86	1.67	1.71
Thompson.....	1,752	2,531	2,484	2,713	2,377	1,555	1.16	1.36	1.05	1.43	1.28	1.53
Malaga.....	3,737	3,719	3,129	2,027	2,096	2,976	1.21	1.23	1.17	1.37	1.08	1.22
Muscot.....	2,429	4,660	4,888	2,754	2,455	931	1.02	1.02	.81	1.06	1.08	1.18
Alicante.....	3,167	4,475	4,966	4,759	5,123	3,480	1.65	1.59	1.22	1.20	1.11	1.16
Carignane.....	774	1,313	1,711	541	1,973	1,654	1.47	1.32	1.06	1.14	.97	1.11
Cornichon.....	625	575	558	314	267	264	1.22	1.17	1.05	1.26	.98	1.26
Mataro.....	193	299	320	193	170	172	1.37	1.30	.96	1.14	1.13	.99
Mission.....	499	530	555	270	263	303	1.31	1.06	.89	1.23	.91	1.15
Petit Syrah.....	244	310	365	257	235	113	1.27	1.35	.96	1.15	1.11	.92
Zinfandel.....	1,017	1,592	1,680	1,402	1,112	624	1.22	1.30	1.00	1.14	1.06	1.05
Total or average.....	17,265	23,031	23,551	17,141	18,628	15,000	1.31	1.30	1.08	1.29	1.11	1.29

Bureau of Agricultural Economics. Compiled from daily reports of the fruit and vegetable market news service. Principal varieties only shown.

<sup>1</sup> Baltimore, Boston, Chicago, Cincinnati, Cleveland, Detroit, Minneapolis, New York, Philadelphia, Pittsburgh, and St. Louis.

<sup>2</sup> Aug. 5 to Nov. 6.

<sup>3</sup> Aug. 2 to Nov. 12.

<sup>4</sup> July 19 to Nov. 30.

<sup>5</sup> Aug. 5 to Nov. 9.

<sup>6</sup> Aug. 4 to Nov. 8.

<sup>7</sup> July 22 to Dec. 18.

<sup>8</sup> 1926, 1927, and 1928 not available.

TABLE 213.—*Grapes: Estimated production and seasonal farm price by States, 1926-1931*

State and division	Production						Seasonal farm price per ton <sup>1</sup>					
	1926	1927	1928	1929	1930	1931 <sup>2</sup>	1926	1927	1928	1929	1930	1931
	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Maine.....	40	68	76	32	32	28						
New Hampshire.....	96	91	58	58	51	50						
Vermont.....	36	45	36	38	42	44						
Massachusetts.....	616	555	476	403	432	384						
Rhode Island.....	212	162	190	271	250	250	55.00					
Connecticut.....	1,275	1,087	1,314	1,404	1,404	1,295	35.00	61.00	46.00	46.00	36.00	22.00
New York.....	106,700	61,520	85,470	79,500	76,670	98,700	50.00	62.00	47.00	50.00	40.00	
New Jersey.....	2,830	2,535	2,822	2,774	3,017	3,083	34.00	61.00	40.00	47.00	43.00	22.00
Pennsylvania.....	25,110	14,550	22,680	21,462	26,180	33,950						
North Atlantic.....	130,914	70,893	113,155	106,143	107,078	137,789						
Ohio.....	29,100	20,000	28,700	14,121	20,300	26,600	40.00	60.00	59.00	62.00	40.00	26.00
Indiana.....	4,606	2,580	4,980	2,338	2,700	3,400	45.00	65.00	60.00	62.00	40.00	38.00
Illinois.....	6,632	3,440	6,800	6,000	4,320	6,800	50.00	70.00	60.00	64.00	44.00	44.00
Michigan.....	60,900	51,700	72,800	68,011	66,400	53,100	35.00	45.00	37.00	41.00	33.00	28.00
Wisconsin.....	409	250	495	338	300	330						
Minnesota.....	85	152	198	299	194	330						
Iowa.....	4,032	5,329	6,225	7,946	5,303	6,700	50.00	56.00	51.00	70.00	65.00	66.00
Missouri.....	12,880	7,000	14,000	8,601	7,500	10,250	45.00	60.00	45.00	60.00	60.00	40.00
Nebraska.....	1,684	1,955	1,920	2,917	2,632	2,800		64.00	60.00	70.00	70.00	50.00
Kansas.....	3,700	3,735	3,465	4,089	3,205	4,500	60.00	50.00	55.00	70.00	70.00	50.00
North Central.....	125,848	93,141	139,533	106,160	113,334	114,420						
Delaware.....	1,536	1,207	1,600	2,357	2,268	2,104						
Maryland.....	1,330	1,225	1,200	1,446	1,673	1,682						
Virginia.....	2,700	2,048	2,560	1,789	1,560	1,880			50.00	65.00	80.00	80.00
West Virginia.....	1,686	720	1,422	853	1,304	1,304						
North Carolina.....	6,840	5,135	6,000	3,718	3,880	4,020	50.00	50.00	45.00	65.00	80.00	80.00
South Carolina.....	1,785	1,540	1,725	811	994	1,031						
Georgia.....	1,822	1,472	1,672	721	808	1,031						
Florida.....	1,700	610	900	912	900	1,010						
South Atlantic.....	18,569	13,957	17,079	11,804	11,917	13,960						
Kentucky.....	1,274	632	1,200	729	635	1,090						
Tennessee.....	1,672	980	1,363	941	950	1,215						
Alabama.....	913	627	760	603	650	730						
Mississippi.....	309	225	289	215	244	251						
Arkansas.....	13,000	3,000	17,000	7,513	7,500	10,000	38.00	65.00	57.00	60.00	30.00	40.00



TABLE 214.—*Grapes, Concord: Average l. c. l. price to jobbers in 12-quart baskets, specified markets, by State of origin, October, 1924-1931*

Year	New York Concord				Michigan Concord		
	Boston	New York	Philadel- phia	Pitts- burgh	Chicago	Minno- apolis	St. Louis
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1924.....	91	84	90	85	68	118	72
1925.....	102	114	104	109	109		
1926.....	61	62	56	60	43	67	56
1927.....	56	61	64	64	55	76	65
1928.....	60	54	49	51	44	59	53
1929.....	50	54	51	48	41	56	49
1930.....	57	51	54	48	41	53	56
1931.....		36	34	20	32	44	42

Bureau of Agricultural Economics. Compiled from daily market reports from bureau representatives in the various markets.

TABLE 215.—*Lettuce: Car-lot shipments, by State of origin, 1920-1931*

State	Crop-movement season <sup>1</sup>											
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931 <sup>2</sup>
	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>
New York.....	1,775	3,240	3,167	3,817	3,698	3,821	3,019	3,496	3,140	3,704	3,219	3,282
New Jersey.....	208	469	572	456	416	463	308	308	144	169	27	18
North Carolina.....	207	445	622	718	714	537	540	447	477	363	364	498
South Carolina.....	121	716	987	576	494	736	372	369	241	310	189	278
Florida.....	2,666	2,910	2,899	2,926	2,490	2,190	707	950	880	1,117	560	940
Idaho.....	25	180	889	1,241	533	500	398	196	72	76	154	177
Colorado.....	129	234	812	1,436	1,036	3,096	2,795	2,348	2,368	2,109	1,610	997
Arizona.....	248	114	577	834	1,776	2,689	4,572	7,679	9,325	9,285	8,431	7,850
Washington.....	354	635	812	1,082	673	820	904	1,151	1,240	1,747	2,230	1,770
California.....	5,997	9,223	10,321	13,916	17,040	20,996	25,126	28,502	32,122	33,854	38,736	35,211
Other states.....	412	531	654	791	661	658	541	400	319	286	218	152
Total.....	12,142	18,697	22,312	27,793	29,461	36,509	39,277	46,346	50,328	53,020	55,718	51,173

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

<sup>1</sup> Crop movement season begins in October of the previous year and extends through December of the given year, i. e., 1920 season begins in October, 1919, and extends through December, 1920.

<sup>2</sup> Preliminary.

TABLE 216.—*Lettuce, commercial crop: Acreage, production, and price per crate, by States, 1928-1931*

Group and State	Acreage				Production				Seasonal farm price per crate			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
<b>Early:<sup>1</sup></b>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>1,000 crates<sup>1</sup></i>	<i>1,000 crates<sup>1</sup></i>	<i>1,000 crates<sup>1</sup></i>	<i>1,000 crates<sup>1</sup></i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
Arizona.....	12,700	16,500	14,000	18,100	1,664	1,768	1,200	1,267	0.88	1.60	2.30	1.20
California (Imperial).....	22,000	27,250	38,100	41,000	3,740	4,006	4,267	3,648	1.62	2.09	1.74	1.58
Florida.....	1,540	2,000	1,560	2,450	498	655	507	646	1.61	1.18	1.82	.78
Lettuce.....	1,500	1,500	1,100	1,600	405	248	371	1,700	1.29	2.20	.80	
Escarole.....	340	500	460	850	153	230	259	275	1.40	1.00	1.65	.76
Texas.....	1,000	800	740	800	100	160	24	22	1.02	1.00	1.00	1.00
Group total.....	37,540	46,550	54,400	61,850	6,002	6,567	6,058	5,584	1.43	1.84	1.87	1.39
<b>Second early:</b>												
Arizona.....	13,500	11,000	23,000	16,000	1,418	1,727	1,725	1,280	1.88	2.85	1.45	1.06
California (other).....	24,500	26,150	31,570	31,600	3,479	2,693	3,062	3,729	1.39	1.86	2.02	1.42
North Carolina.....	1,490	1,160	1,400	1,500	171	136	130	201	1.60	1.65	.98	.60
South Carolina.....	750	600	450	600	112	104	59	93	2.11	1.83	2.16	1.24
Group total.....	40,240	38,910	56,420	49,700	5,180	4,660	4,978	5,303	1.55	2.22	1.80	1.30
<b>Intermediate:</b>												
Idaho.....	50	60	70	70	5	9	14	9	1.67	2.25	1.40	1.25
New Jersey.....	1,200	1,000	950	1,000	270	200	142	250	1.70	1.90	1.86	1.20
Oregon.....	50	70	80	80	7	6	8	6	1.25	1.30	1.05	.80
Virginia.....	300	280	200	200	60	57	28	36	1.45	1.00	2.00	1.75
Washington.....	1,850	2,500	3,350	3,000	370	525	670	600	1.00	1.27	.75	.77
Group total.....	3,450	3,910	4,650	4,350	712	797	862	901	1.31	1.42	.99	.93
<b>Late (Sec. 1):</b>												
California.....	7,800	9,630	12,700	12,800	975	1,194	1,651	1,536	2.16	2.12	1.93	2.36
Colorado.....	8,800	8,100	7,440	6,650	1,012	891	670	698	1.07	1.25	.85	1.30
New Mexico.....	430	220	200	200	30	20	16	22	1.35	1.20	1.05	.90
New York.....	4,460	5,800	5,450	5,050	1,004	1,740	1,499	1,010	2.08	1.13	1.05	1.45
Pennsylvania.....	80	80	80	80	9	12	11	13	2.70	1.20	1.05	1.50
Group total.....	21,570	23,860	25,870	24,780	3,080	3,857	3,847	3,179	1.96	1.46	1.39	1.86
<b>Late (Sec. 2):</b>												
California.....	19,120	24,500	29,750	34,200	3,174	4,067	3,540	3,317	2.24	1.74	1.89	1.50
Idaho.....	280	290	340	380	41	42	54	57	1.67	.75	1.00	1.10
New Jersey.....	1,100	700	650	1,000	165	150	156	100	2.26	2.20	1.78	1.20
Oregon.....	50	50	50	250	4	5	38	38	1.25	1.80	.80	.95
Washington.....	350	350	450	450	70	72	90	90	1.25	1.50	.95	1.05
Wyoming.....	40	40	40	-----	3	3	3	-----	1.82	1.30	.90	-----
Group total.....	20,940	25,930	31,280	36,280	3,457	4,339	3,848	3,602	2.21	1.74	1.85	1.47
Total all States.....	123,740	139,160	172,620	176,960	18,381	20,220	19,591	18,569	1.69	1.82	1.71	1.44

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

<sup>1</sup> Western crates containing 4 dozen heads.<sup>2</sup> Season begins in fall of the previous year.TABLE 217.—*Olives: Production and value, California, 1922-1931*

Year	Production	Seasonal farm price	Farm value	Year	Production	Seasonal farm price	Farm value
	<i>Short tons</i>	<i>Dollars</i>	<i>1,000 dollars</i>		<i>Short tons</i>	<i>Dollars</i>	<i>1,000 dollars</i>
1922.....	10,000	125.00	1,250	1927.....	21,500	80.00	1,720
1923.....	17,000	65.00	1,105	1928.....	23,900	80.00	1,912
1924.....	6,500	92.00	598	1929.....	21,000	75.00	1,575
1925.....	14,000	60.00	840	1930.....	20,000	70.00	1,400
1926.....	12,000	80.00	960	1931.....	16,000	<sup>2</sup> 54.00	864

Bureau of Agricultural Economics.

<sup>1</sup> Preliminary.<sup>2</sup> Seasonal average price to Dec. 1.

TABLE 218.—*Olive oil (including inedible): International trade, average 1925-1929, annual 1927-1930*

Country	Calendar year									
	Average 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports
<b>PRINCIPAL EXPORTING COUNTRIES</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
Spain.....	164,975	2,122,252	0	263,197	0	113,251	0	235,678	0	0
Italy.....	66,494	1,769	76,527	1,221	26,697	3,509	79,298	313	159,208	128,662
Tunis.....	53,947	1,458	56,770	486	30,880	2,485	95,808	11	109,301	151
Greece.....	28,599	123	20,389	20,215	82	31,709	18,514	18,514	18,514	18,514
Algeria.....	28,466	115	13,190	85	48,096	38	28,505	162	54,152	67
Turkey <sup>1</sup> .....	18,185	198	23,845	193	5,084	42	33,928	520	10,452	4
Syria and Lebanon <sup>1</sup> .....	4,283	339	8,622	312	904	295	5,618	180	6,397	413
Morocco.....	4,208	282	142	306	10,375	186	6,802	417	3	1,381
Yugoslavia.....	1,077	861	1,289	559	1,120	1,819	2,230	400	822	542
<b>Total.....</b>	<b>370,232</b>	<b>5,147</b>	<b>323,026</b>	<b>3,162</b>	<b>409,518</b>	<b>7,956</b>	<b>397,153</b>	<b>2,003</b>	<b>594,027</b>	<b>131,200</b>
<b>PRINCIPAL IMPORTING COUNTRIES</b>										
United States.....	0	135,847	0	124,152	0	131,214	0	153,005	0	162,860
Argentina <sup>1</sup> .....	0	95,334	0	77,066	0	116,417	0	112,309	0	130,715
France.....	13,958	40,146	17,151	27,467	17,508	40,286	14,347	49,186	27,659	78,442
United Kingdom.....	324	19,100	392	18,980	273	20,727	338	20,541	269	21,179
Cuba.....	0	16,654	0	12,919	0	18,927	0	16,831	0	21,644
Chile.....	0	14,103	0	12,281	0	26,679	0	7,796	0	6,739
Uruguay.....	0	13,410	0	10,326	0	16,577	0	13,790	0	18,753
Brazil.....	0	12,808	0	9,661	0	20,005	0	9,814	0	18,399
Norway.....	0	7,098	0	7,006	0	7,183	0	10,453	0	5,883
Macao (Portuguese China) <sup>1</sup> .....	4	2,331	4	6,813	837	6,395	3,331	2,246	8,020	26,610
Portugal.....	5,722	6,059	3,406	23,722	13,541	362	3,361	7,666	1,147	2,148
Palestine.....	710	5,726	2,140	4,421	479	7,835	361	7,666	1,147	2,148
Canada.....	0	4,044	0	4,443	0	5,132	0	4,732	0	6,487
Switzerland.....	2	3,443	7	2,881	0	3,734	0	3,701	0	4,847
Egypt.....	32	2,666	30	1,911	35	2,196	26	2,046	24	3,907
Germany.....	53	2,631	50	2,438	55	2,919	87	2,600	50	3,393
Mexico.....	0	2,230	0	1,520	0	2,508	0	2,304	0	3,827
Rumania.....	1	1,871	4	2,063	0	2,508	2	1,480	0	1,540
Australia <sup>1</sup> .....	1	1,545	1	1,351	0	1,841	0	1,996	2	2,530
Belgium.....	33	1,319	17	796	46	1,313	11	1,127	23	1,659
Peru.....	0	1,272	0	917	0	1,667	0	1,528	0	507
Bulgaria.....	0	1,227	0	1,031	0	598	0	433	0	507
Czechoslovakia.....	24	958	62	911	5	1,119	1	1,071	2	1,207
Sweden.....	4	454	5	312	4	452	2	601	3	810
Japan.....	0	330	0	309	0	322	0	349	0	292
Philippine Islands.....	0	312	0	328	0	271	0	340	0	292
Netherlands.....	7	181	17	150	4	209	3	185	16	280
New Zealand.....	0	173	0	141	0	273	0	166	0	312
Denmark.....	6	154	4	209	7	116	6	104	5	341
<b>Total.....</b>	<b>23,208</b>	<b>398,508</b>	<b>25,148</b>	<b>354,967</b>	<b>32,794</b>	<b>437,256</b>	<b>13,515</b>	<b>429,446</b>	<b>37,220</b>	<b>525,250</b>

Bureau of Agricultural Economics. Official sources except where otherwise noted. Conversions made on the basis of 7.5 pounds to the gallon.

<sup>1</sup> Preliminary.

<sup>2</sup> 2-year average.

<sup>3</sup> International Yearbook of Agricultural Statistics.

<sup>4</sup> 4-year average.

TABLE 219.—Onions, commercial crop: Acreage, production, and price per bushel, by States, 1928-1931

Group and State	Acreage				Production				Seasonal farm price to Dec. 1, per bushel			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
Early (Bermuda and Creole):												
California.....	3,950	3,450	2,050	1,250	1,000 bush. <sup>1</sup>	1,000 bush. <sup>1</sup>	1,000 bush. <sup>1</sup>	1,000 bush. <sup>1</sup>	Dolls.	Dolls.	Dolls.	Dolls.
California.....	3,950	3,450	2,050	1,250	1,000 bush. <sup>1</sup>	1,000 bush. <sup>1</sup>	1,000 bush. <sup>1</sup>	1,000 bush. <sup>1</sup>	Dolls.	Dolls.	Dolls.	Dolls.
California.....	3,950	3,450	2,050	1,250	1,000 bush. <sup>1</sup>	1,000 bush. <sup>1</sup>	1,000 bush. <sup>1</sup>	1,000 bush. <sup>1</sup>	Dolls.	Dolls.	Dolls.	Dolls.
Louisiana.....	2,310	2,180	1,260	1,100	293	277	77	94	0.77	1.25	0.98	0.95
Texas.....	18,280	19,700	16,310	17,200	3,546	3,763	3,360	3,492	1.10	1.02	1.16	1.19
Group total.....	24,540	25,330	19,620	19,550	4,819	4,909	4,007	3,925	1.03	1.06	.75	.77
Intermediate(domestic):												
California.....	780	840	940	1,100	299	373	466	483	.75	.45	.48	.57
Iowa, Scott Co. Dist.	1,000	1,000	1,050	1,050	288	280	336	194	.88	.86	.91	.85
Kentucky.....	800	600	510	400	320	48	18	150	.45	.43	.75	.70
New Jersey.....	2,700	2,000	2,200	2,400	702	490	396	660	1.00	1.20	1.00	.85
Texas, Collin Co. District.....	2,000	1,170	1,350	1,810	780	302	279	452	.56	1.27	.94	.78
Virginia, E. Shore.....	500	700	560	560	92	119	56	84	.51	1.15	1.00	.70
Washington, Walla Walla Co.....	700	810	850	800	290	405	412	304	.40	.73	.56	.50
Group total.....	8,480	7,120	7,460	8,120	2,751	1,997	1,963	2,827	.70	.89	.76	.72
Late (domestic):												
California.....	5,300	6,040	6,680	5,300	1,569	1,727	2,017	1,463	1.28	.86	.61	.83
Colorado.....	3,760	7,000	5,600	4,050	1,241	2,583	1,725	923	1.42	.45	.32	.74
Idaho.....	1,000	1,000	1,700	1,500	700	475	626	325	1.14	.50	.80	.90
Illinois.....	740	770	750	690	169	212	188	110	1.22	.79	.72	.90
Indiana.....	8,510	8,400	9,120	7,750	2,042	2,436	3,493	1,318	1.60	.56	.37	.80
Iowa, other.....	1,760	1,900	2,000	2,500	579	627	680	282	1.15	.60	.48	.90
Massachusetts.....	2,500	2,950	2,730	2,620	840	1,136	1,147	970	1.01	.85	.63	.90
Michigan.....	5,000	5,700	6,700	6,260	1,350	2,029	2,767	1,171	1.40	.62	.43	.75
Minnesota.....	1,740	2,160	2,650	1,900	632	756	702	380	1.28	.60	.37	.80
Nevada.....		150	130	120		32	43	25		.64	.42	.84
New York.....	5,830	7,910	8,000	8,200	1,283	3,243	3,576	2,780	1.35	.75	.45	.85
Ohio.....	6,550	6,600	5,400	5,300	891	1,650	1,404	874	1.60	.55	.42	.70
Oregon.....	950	1,040	1,080	1,100	361	406	486	468	1.43	.60	.32	.85
Pennsylvania.....	350	340	350	350	86	94	86	91	1.10	.90	.70	.90
Utah.....	1,000	1,100	1,200	700	520	475	398	305	1.20	.50	.35	.65
Washington, other.....	710	850	950	900	373	408	428	405	1.12	.53	.30	.80
Wisconsin.....	1,100	980	940	870	385	294	263	235	1.25	.66	.55	.75
Group total.....	47,800	54,890	55,980	49,010	13,021	18,583	20,632	12,605	1.35	.63	.43	.80
Total domestic.....	56,280	62,010	63,440	57,130	15,772	20,580	21,995	14,932	1.23	.66	.46	.79
Total all States.....	80,820	87,340	83,060	76,680	20,591	25,489	26,002	18,857	1.19	.74	.51	.79

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

<sup>1</sup> Bushels containing approximately 57 pounds.<sup>2</sup> Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

TABLE 220.—Onions: United States imports, by countries, annual, 1920-21 to 1930-31

Year beginning July—	Neth-er-lands	Spain	Italy	United Kingdom	Canada	Can-ary Is-lands	Ber-mu-da	Mex-ico	Chile	Aus-tra-lia	Egypt	Other coun-tries	Total
	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.
1921-22.....	40	1,522	74	247	66	18	34	26	43	119	243	56	2,488
1922-23.....	33	990	11	157	42	13	18	20	1	3	447	48	1,783
1923-24.....	( <sup>1</sup> )	1,098	17	52	1	8	9	29	30	4	148	10	1,406
1924-25.....	60	1,090	19	71	29	7	9	18	79	8	618	67	2,075
1925-26.....	11	1,342	100	36	11	4	9	20	26	3	599	33	2,194
1926-27.....	48	1,084	65	59	9	2	9	1	76	8	912	25	2,298
1927-28.....	11	701	35	12	2	1	3	( <sup>1</sup> )	213	3	892	26	1,399
1928-29.....	580	1,007	145	26	4	2	( <sup>1</sup> )	11	4	4	105	32	2,050
1929-30.....	5	768	42	11	( <sup>1</sup> )	1	( <sup>1</sup> )	( <sup>1</sup> )	49	2	88	2	918
1930-31.....	0	177	24	1	2	0	( <sup>1</sup> )	0	10	0	0	0	214

Bureau of Agricultural Economics. Compiled from official records of the Bureau of Foreign and Domestic Commerce.

<sup>1</sup> Less than 500 bushels.

TABLE 221.—Onions: Car-lot shipments, by State of origin, 1920-21 to 1930-31

State	Crop-movement season <sup>1</sup>										
	1920-21	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31 <sup>2</sup>
	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>
Massachusetts	3,914	2,244	1,912	2,454	2,481	2,856	3,586	2,495	1,416	1,854	1,474
New York	3,384	2,860	2,612	5,505	5,335	5,109	3,720	4,102	1,807	3,985	4,226
New Jersey	371	429	479	335	403	235	253	295	333	239	193
Ohio	3,239	1,749	4,493	2,714	4,492	1,856	2,267	4,070	1,774	2,888	2,293
Indiana	4,124	1,772	4,684	4,610	3,735	4,158	4,493	5,000	3,939	5,195	6,579
Illinois	409	251	487	378	241	291	158	142	180	142	193
Michigan	939	417	1,867	1,222	1,623	1,402	2,171	2,653	2,664	2,064	5,499
Wisconsin	409	90	330	273	212	361	270	279	294	241	219
Minnesota	287	169	500	189	487	674	684	1,289	1,077	1,448	1,141
Iowa	830	416	927	882	1,176	1,365	1,434	1,333	1,430	1,492	1,762
Virginia	139	280	371	274	345	138	173	131	178	234	109
Kentucky	804	382	258	263	266	152	134	145	69	59	12
Texas	4,957	4,209	4,630	3,027	3,918	3,941	5,316	4,028	7,081	7,232	6,312
Idaho	28	50	161	255	322	876	531	891	1,152	731	677
Colorado	150	447	651	928	1,004	1,809	1,758	1,400	2,244	4,042	2,124
Utah	9	54	170	177	216	599	602	654	1,029	950	551
Washington	810	702	765	1,128	1,016	1,000	1,200	1,302	1,153	1,417	1,464
Oregon	27	343	263	392	558	681	678	671	663	660	730
California	4,802	3,542	3,631	4,145	2,671	3,803	3,013	3,753	4,492	4,144	4,062
Other States	340	254	369	330	235	540	536	499	351	204	147
Total	29,472	20,890	29,760	29,480	30,796	31,646	33,062	35,192	33,326	40,281	40,067

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car-lots include those by boat reduced to car-lot basis.

<sup>1</sup> Crop movement season extends from Mar. 1 of one year through June of the following year.

<sup>2</sup> Preliminary.

TABLE 222.—Peaches: Total production, average price per bushel, and foreign trade of the United States, 1913-1931

Year	Production	Price per bushel, received by producers <sup>2</sup>	Farm value	Domestic exports, year beginning July 1 <sup>3</sup>			
				Fresh	Dried	Canned <sup>4</sup>	Total in terms of fresh
	<i>1,000 bushels</i>	<i>Dollars</i>	<i>1,000 dollars</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 bushels</i>
1913	39,707	—	—	—	6,712	—	736
1914	54,109	—	—	—	14,465	—	1,586
1915	64,097	—	—	—	13,739	—	1,507
1916	37,505	—	—	—	8,188	—	898
1917	48,765	—	—	—	5,863	—	643
1918	33,094	1.62	53,637	—	4,835	—	530
1919	50,686	—	—	—	—	—	—
1920	53,178	1.89	100,435	—	12,756	—	1,399
1921	45,620	2.10	95,970	—	3,573	—	392
1922	32,602	1.59	51,739	611	6,200	—	699
1923	55,852	1.84	74,717	13,170	5,586	54,624	3,103
1924	47,766	1.37	62,025	15,065	12,976	50,374	3,885
1925	53,843	1.26	68,084	16,172	4,668	57,390	3,240
1926	48,562	1.38	64,171	15,749	3,851	83,100	4,161
1927	69,865	1.00	69,426	14,453	6,968	81,806	4,477
1928	45,463	1.18	50,494	17,969	6,542	86,634	4,701
1929	68,369	.99	63,643	22,067	12,436	101,438	6,050
1930	45,026	1.35	60,982	19,973	3,847	74,470	3,941
1931	53,864	.89	43,825	12,859	8,482	75,763	4,855
1931 <sup>5</sup>	77,743	.56	41,377	—	—	—	—

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board; italic figures are census returns. Prices based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 Census. Earlier years not so revised.

<sup>1</sup> Dried peaches converted to terms of fresh on the basis that dried peaches equal 19 per cent of fresh. Canned peaches converted to terms of fresh on the basis that 26 pounds of fresh equal 1 dozen cans of 1 pound each; 48 pounds fresh equals 1 bushel. In practice, 1 bushel of fresh fruit is figured as the equivalent of 2 dozen cans of 1 pound each.

<sup>2</sup> Compiled from Commerce and Navigation of the United States, 1913-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1926, January and June issues, 1927-1931.

<sup>3</sup> From 1918 to 1922, Sept. 15 price; 1923-1925, Sept. 15 price in North, Aug. 15 price in South; 1926-1931, approximate average price for the season, as reported Dec. 1.

<sup>4</sup> Canned peaches were reported in value only prior to July 1, 1922.

<sup>5</sup> No exports reported prior to Jan. 1, 1922; figures for 1921 represent exports Jan. 1, 1922, to June 30, 1922. <sup>6</sup> Includes fruit not harvested as follows: 1926, 1,462,000 bushels in Georgia and northern States; 1927, 2,708,000 bushels in California; 1928, 2,917,000 bushels in California and 1,000,000 bushels in Georgia; 1930, 10,638,000 bushels in California; 1931, 8,063,000 bushels in California. Values are based on the quantity actually harvested plus a quantity of fruit that was sold but left on trees in 1930 and 1931.

<sup>7</sup> Preliminary.

# STATISTICS OF FRUITS AND VEGETABLES

721

TABLE 223.—*Peaches: Production and seasonal farm price, by States, 1925-1931*

State and division	Production							Seasonal farm price per bushel <sup>1</sup>						
	1925	1926	1927	1928	1929	1930	1931 <sup>2</sup>	1925	1926	1927	1928	1929	1930	1931
	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
New Hampshire	34	29	26	25	17	24	26	2.00	1.50	2.20	2.40	2.00	2.00	1.55
Massachusetts	218	213	140	189	131	185	153	2.50	1.80	2.10	2.30	2.10	1.60	1.25
Rhode Island	30	37	23	27	29	32	41	3.00	1.70	2.10	2.30	2.50	1.80	1.40
Connecticut	210	255	186	239	154	249	210	2.80	1.70	2.20	1.90	2.00	1.30	1.40
New York	1,920	2,300	1,140	2,400	1,076	1,580	1,700	1.90	.90	1.90	1.45	1.80	1.15	.65
New Jersey	1,740	3,000	2,304	1,625	1,990	1,340	2,200	1.50	.70	1.50	1.35	1.15	1.70	.65
Pennsylvania	600	2,498	947	1,867	1,234	1,025	2,720	2.40	1.00	2.00	1.55	1.75	1.70	.65
North Atlantic	4,752	8,332	4,766	6,372	4,631	4,435	7,050	1.89	.92	1.75	1.50	1.53	1.48	.69
Ohio	1,100	2,120	1,326	1,742	478	300	2,500	2.15	1.25	1.95	1.55	1.95	1.95	.55
Indiana	320	900	242	605	978	12	1,470	2.30	1.60	2.35	1.60	1.60	2.00	.55
Illinois	600	2,690	1,122	1,638	3,320	( <sup>3</sup> )	4,300	2.50	1.25	2.05	1.40	1.35	—	.60
Michigan	592	1,664	578	1,156	998	780	1,935	2.20	1.00	2.10	1.55	1.90	1.65	.60
Iowa	12	97	65	80	77	9	117	2.80	1.60	1.95	1.50	1.50	1.70	.90
Missouri	870	1,722	340	655	804	24	1,600	1.80	1.25	1.90	1.55	1.40	1.95	.65
Nebraska	33	50	52	6	52	25	60	2.35	1.60	1.60	2.00	1.65	1.90	1.05
Kansas	371	266	259	84	256	35	350	1.85	1.70	1.75	1.90	1.55	1.75	.90
North Central	3,798	9,379	4,014	5,936	7,023	1,185	12,232	2.11	1.26	2.00	1.52	1.52	1.74	.57
Delaware	155	450	287	100	401	190	500	1.55	.85	1.10	1.20	1.10	1.60	.45
Maryland	240	700	352	465	655	300	800	1.85	.75	1.50	1.30	1.20	1.50	.60
Virginia	362	1,176	400	880	1,058	270	1,600	1.90	1.00	1.60	1.40	1.00	1.80	.60
West Virginia	100	1,000	202	810	489	122	1,080	2.20	1.25	2.10	1.50	1.55	1.80	.55
North Carolina	1,500	2,250	1,300	2,590	1,400	1,800	3,128	1.60	.90	1.70	1.15	1.40	1.35	.65
South Carolina	740	1,054	615	1,363	690	1,190	1,784	1.35	1.00	1.50	1.10	1.35	1.35	.70
Georgia	7,304	9,400	5,943	10,000	3,700	5,500	9,134	1.40	.80	1.35	.90	1.15	1.15	.55
Florida	115	125	69	112	66	72	92	1.65	1.60	1.75	1.35	1.70	1.20	.95
South Atlantic	10,518	16,155	9,168	16,320	8,459	9,444	18,068	1.46	.88	1.44	.97	1.22	1.26	.59
Kentucky	570	1,110	180	1,035	530	70	1,280	1.75	1.30	1.90	1.25	1.45	1.75	.55
Tennessee	1,415	1,890	638	2,190	1,325	600	2,520	1.55	1.05	1.70	1.10	1.25	1.35	.50
Alabama	1,312	1,189	540	1,350	505	1,105	1,530	1.60	1.10	1.50	1.10	1.30	1.20	.65
Mississippi	712	551	279	635	560	638	1,060	1.55	1.40	1.65	1.45	1.50	1.45	.75
Arkansas	2,300	2,400	1,628	3,000	1,900	84	3,600	1.50	1.05	1.40	1.20	1.20	1.60	.55
Louisiana	275	228	58	211	195	142	352	2.00	1.50	1.80	1.60	1.70	1.75	1.05
Oklahoma	950	180	760	490	1,116	80	490	1.33	1.30	1.30	1.60	1.00	1.80	.90
Texas	1,760	2,310	800	1,613	2,073	750	1,681	1.50	1.10	1.60	1.30	1.25	1.40	.90
South Central	9,184	9,798	4,911	10,513	8,204	3,469	12,623	1.54	1.13	1.51	1.21	1.25	1.36	.64
Idaho	23	297	144	335	183	15	170	1.90	1.00	1.60	1.05	1.35	2.00	.75
Colorado	450	976	892	650	953	787	1,130	1.90	1.10	1.20	1.20	1.45	1.45	.50
New Mexico	158	131	40	46	109	60	103	1.75	1.80	2.20	1.95	1.80	1.90	1.15
Arizona	65	91	55	66	68	88	80	1.70	1.70	2.30	2.00	1.80	1.80	1.45
Utah	100	550	561	612	604	370	550	2.00	.90	1.20	.95	1.00	1.35	.50
Nevada	8	8	2	5	6	6	3	2.25	1.50	2.30	2.00	2.25	2.00	2.00
Washington	870	1,223	250	1,470	1,225	556	1,050	1.85	.90	1.75	1.00	1.35	1.35	.65
Oregon	222	384	160	292	227	280	224	1.80	1.20	1.60	1.40	1.70	1.15	1.10
California	16,418	22,542	20,500	25,752	13,334	33,169	24,460	.86	.94	.60	.55	.38	.54	.43
Clingstone	8,960	13,625	13,417	17,252	7,459	22,585	16,751	—	—	—	—	1.64	.48	.39
Freestone	7,458	8,917	7,083	8,500	5,875	10,584	7,709	—	—	—	—	1.00	.66	.50
Western	13,312	26,201	22,604	29,228	16,709	35,331	27,770	.96	.95	.68	.56	1.36	.60	.46
United States	46,562	69,865	45,463	68,369	45,026	53,864	77,743	1.38	1.00	1.18	.99	1.35	.89	.56

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board. Prices are based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 Census. Earlier years not so revised.

<sup>1</sup> In 1925, Sept. 15 price in North, Aug. 15 price in South; 1926-1931, approximate average price for the season as reported Dec. 1.

<sup>2</sup> Preliminary.

<sup>3</sup> Crop failure.

<sup>4</sup> Includes fruit not harvested as follows: 1926, 1,462,000 bushels in Georgia and Northern States; 1927, 2,708,000 bushels in California; 1928, 2,917,000 bushels in California and 1,000,000 bushels in Georgia; 1930, 10,638,000 bushels in California; 1931, 8,063,000 bushels in California. Values are based on the quantity actually harvested plus a quantity of fruit that was sold but left on trees in 1930 and 1931.

TABLE 224.—*Peaches: Car-lot shipments, by State of origin, 1928-1931 and total United States shipments, 1921-1931*<sup>1</sup>

State	1928	1929	1930	1931 <sup>2</sup>						
				Total	May	June	July	Aug.	Sept.	Oct.
	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars
Massachusetts	—	5	3	—	—	—	—	—	—	—
Connecticut	2	1	26	3	—	—	—	—	3	—
New York	1,744	865	2,310	988	—	—	—	—	849	139
New Jersey	41	544	24	88	—	—	—	24	64	—
Pennsylvania	806	732	330	659	—	—	—	98	500	1
Ohio	426	2	98	122	—	—	—	—	122	—
Indiana	398	676	—	561	—	—	1	461	99	—
Illinois	1,975	4,637	( <sup>3</sup> )	5,321	—	—	18	5,196	107	—
Michigan	514	312	183	259	—	—	—	2	257	—
Missouri	2	56	—	82	—	—	—	82	—	—
Nebraska	—	1	—	—	—	—	—	—	—	—
Kansas	—	2	—	—	—	—	—	—	—	—
Delaware	80	540	31	481	—	—	—	432	49	—
Maryland	261	465	83	147	—	—	—	98	49	—
Virginia	324	623	19	445	—	—	2	416	27	—
West Virginia	166	246	32	122	—	—	—	52	70	—
North Carolina	3,242	1,250	2,172	2,564	—	27	841	1,696	—	—
South Carolina	865	602	747	848	—	39	247	562	—	—
Georgia	15,926	5,298	8,623	13,448	34	1,655	8,812	2,947	—	—
Florida	8	—	—	—	—	—	—	—	—	—
Kentucky	87	60	—	217	—	—	—	216	—	—
Tennessee	2,077	1,144	268	1,364	—	1	17	1,346	—	—
Alabama	325	81	42	232	—	35	140	57	—	—
Mississippi	76	60	7	119	1	23	85	10	—	—
Arkansas	4,010	2,679	41	4,208	—	65	1,828	2,315	—	—
Louisiana	—	12	2	13	—	—	13	—	—	—
Oklahoma	17	121	—	4	—	—	—	4	—	—
Texas	278	509	21	143	—	16	123	4	—	—
Idaho	125	135	1	31	—	—	—	14	17	—
Colorado	1,117	1,765	1,369	1,503	—	—	—	660	834	9
New Mexico	—	3	—	—	—	—	—	—	—	—
Utah	694	550	341	215	—	—	—	2	213	—
Washington	1,711	1,554	609	912	—	—	5	613	291	3
Oregon	76	51	48	28	—	—	—	3	22	3
California	19,589	9,780	21,072	10,958	12	180	3,563	6,466	737	—

## TOTAL, ALL STATES

Year	May	June	July	Aug.	Sept.	Oct.	Total
	Cars	Cars	Cars	Cars	Cars	Cars	Cars
1921	1,325	4,005	9,544	7,381	5,035	44	27,334
1922	695	3,189	7,598	11,928	13,779	1,216	38,405
1923	1	2,384	10,903	9,757	9,654	706	33,525
1924	28	1,873	14,603	13,781	7,889	1,323	39,497
1925	328	4,951	17,932	9,921	7,420	306	40,858
1926	52	2,209	21,793	24,538	8,847	1,026	58,465
1927	267	5,638	12,675	13,217	9,739	178	41,714
1928	12	1,755	23,122	22,819	8,802	462	56,972
1929	106	2,374	10,429	14,012	8,308	222	35,451
1930	18	2,515	12,956	15,526	7,333	142	38,490
1931 <sup>2</sup>	47	2,041	15,691	23,776	4,370	155	46,060

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis. Shipments by truck not included in this table. See 1927 Yearbook, p. 855, for data for earlier years.

<sup>1</sup> Crop movement season extends from May 1 through October of a given year.

<sup>2</sup> Preliminary.

<sup>3</sup> No shipments in 1930 because of frost killing.

<sup>4</sup> Includes 1 car in November.

<sup>5</sup> Includes 5 cars in November.

## STATISTICS OF FRUITS AND VEGETABLES

723

TABLE 225.—*Pears: Total production, foreign trade of the United States, and average price per bushel, 1913-1931*

Year	Production	Price per bushel received by producers <sup>1</sup>	Farm value	Domestic exports, year beginning July <sup>1</sup>			
				Fresh <sup>2</sup>	Canned <sup>3</sup>	Dried	Total in terms of fresh
	1,000 bushels	Dollars	1,000 dollars	1,000 pounds	1,000 pounds	1,000 pounds	1,000 bushels
1913.....	10,108						
1914.....	12,086						
1915.....	11,216						
1916.....	11,874						
1917.....	13,281						
1918.....	13,362	1.38	18,419				
1919.....	14,804						
1919.....	15,006	1.84	27,614				
1920.....	16,805	1.66	27,865				
1921.....	11,297	1.71	19,268				
1922.....	20,705	1.06	21,943	36,785	49,358		2,823
1923.....	17,845	1.21	21,570	50,237	38,431		2,643
1924.....	18,866	1.42	26,689	41,452	53,851		3,107
1925.....	20,720	1.40	29,066	71,205	75,876		4,645
1926.....	25,249	.89	22,399	73,877	66,104		4,293
1927.....	18,373	1.32	24,298	51,056	52,671		3,258
1928.....	24,212	1.02	24,663	82,847	82,652	4,626	5,388
1929.....	21,172	1.43	30,202	62,024	54,709	3,655	3,876
1930.....	* 25,540	.75	18,158	134,670	74,354	8,037	6,573
1931 <sup>6</sup> .....	* 23,009	.60	13,567				

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board; italic figures are census returns. Prices are based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 Census. Earlier years not so revised.

<sup>1</sup> Canned pears converted to terms of fresh on the basis that 1 pound canned fruit is equivalent to 2 pounds fresh; dried pears converted to terms of fresh on the basis that dried pears equal 25 per cent of fresh; 48 pounds fresh equals 1 bushel. No imports of pears reported.

<sup>2</sup> From 1918 to 1925, Nov. 15 price; 1926 to 1931, approximate average price for the season as reported Dec. 1.

<sup>3</sup> Exports were reported in value only, prior to July 1, 1922.

<sup>4</sup> January-June, 1929. Not previously reported.

<sup>5</sup> Includes some quantities not harvested on account of market conditions (1,292,000 bushels in 1930 and 458,000 in 1931). Prices and value are computed on harvested crop.

<sup>6</sup> Preliminary.

TABLE 226.—*Pears: Car-lot shipments, by State of origin, 1921-22 to 1930-31*Crop-movement season<sup>1</sup>

State	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31 <sup>2</sup>
	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars
New York.....	2,893	5,461	1,701	2,978	4,510	2,263	1,694	1,590	547	2,661
New Jersey.....	25	40	75	60	52	47	19	16	4	19
Ohio.....	17	96	33	47	62	100	130	104	33	77
Illinois.....	33	468	318	505	614	858	228	370	787	154
Michigan.....	665	1,880	543	894	151	457	536	449	147	469
Delaware.....		151	541	273	128	249	49	1	20	13
Maryland.....	3	36	63	30	29	33	32	27	42	9
Alabama.....	38	79	60	27	66	12	93	71	152	135
Texas.....	115	50	99	129	121	144	213	39	231	100
Colorado.....	745	774	696	955	717	750	737	264	1,082	249
Utah.....	33	82	65	81	29	77	34	49	47	38
Washington.....	2,903	2,678	4,274	2,456	3,560	5,278	2,589	5,868	4,035	6,157
Oregon.....	985	1,862	2,575	1,483	2,225	2,909	2,977	4,437	4,211	5,116
California.....	4,500	6,465	7,143	6,312	8,718	11,673	9,215	11,003	9,465	* 13,491
Other States.....	112	279	402	426	275	359	198	146	344	138
Total.....	13,053	20,381	18,589	16,246	21,257	25,209	13,744	24,434	21,147	23,821

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

<sup>1</sup> Crop movement season extends from June of one year through May of the following year.

<sup>2</sup> Preliminary.

<sup>3</sup> Includes 1 car in May, 1930, and 20 cars in June, 1931.

TABLE 227.—Pears: Production and seasonal farm price, by States, 1925-1931

State and division	Production							Seasonal farm price per bushel <sup>1</sup>						
	1925	1926	1927	1928	1929	1930	1931 <sup>2</sup>	1925	1926	1927	1928	1929	1930	1931
	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	Dol-lars	Dol-lars	Dol-lars	Dol-lars	Dol-lars	Dol-lars	Dol-lars
Maine.....	13	6	13	10	18	12	13	1.90	1.50	1.70	1.50	1.85	1.70	1.80
New Hampshire.....	19	10	14	9	13	13	12	1.58	1.65	1.70	1.70	1.60	1.50	1.40
Vermont.....	12	6	12	6	12	9	11	1.62	2.00	2.15	2.10	1.95	1.60	1.50
Massachusetts.....	90	60	81	56	59	74	46	1.65	1.80	1.75	1.70	1.80	1.20	1.30
Rhode Island.....	13	12	12	7	8	9	7	1.75	1.60	1.80	1.80	2.00	1.25	1.30
Connecticut.....	60	57	54	42	22	29	18	2.00	1.90	2.00	1.60	2.00	1.15	1.60
New York.....	3,045	2,988	1,872	1,800	715	1,936	805	1.55	1.25	1.50	1.45	1.85	.90	.90
New Jersey.....	512	645	420	502	73	104	96	1.70	.65	1.00	1.00	1.60	.90	.65
Pennsylvania.....	468	748	400	620	195	438	448	1.55	1.15	1.50	1.20	1.55	1.10	.65
North Atlantic.....	4,232	3,632	2,878	3,052	1,113	2,623	1,456	1.58	1.15	1.45	1.34	1.78	.96	.84
Ohio.....	354	430	250	395	204	220	510	1.25	.85	1.25	.90	1.40	1.15	.50
Indiana.....	209	328	140	288	185	111	244	1.00	.65	1.05	.75	.85	.90	.40
Illinois.....	540	818	312	540	600	265	765	1.20	.75	1.10	.85	.90	.95	.45
Michigan.....	450	389	702	819	346	602	450	1.15	.80	1.25	.95	1.35	1.05	.65
Wisconsin.....	15	—	—	—	—	—	—	1.50	—	—	—	—	—	—
Iowa.....	45	68	41	47	63	59	93	1.70	1.20	1.50	1.20	1.35	1.45	.90
Missouri.....	342	473	270	171	447	177	539	1.20	.80	1.15	1.15	.95	1.10	.55
Nebraska.....	18	29	36	12	53	36	35	2.00	1.60	1.60	1.90	1.50	1.55	1.00
Kansas.....	105	186	268	51	256	118	220	1.50	1.25	1.10	1.40	1.10	1.15	.65
North Central.....	2,138	3,221	2,009	2,328	2,184	1,588	2,866	1.22	.82	1.19	.93	1.08	1.08	.54
Delaware.....	180	388	128	108	33	20	39	1.00	.40	.60	.60	.50	.55	.40
Maryland.....	280	394	193	183	115	81	149	1.00	.55	.90	.90	.80	.85	.45
Virginia.....	135	410	130	230	402	100	510	1.30	.80	1.15	1.05	.90	1.35	.50
West Virginia.....	34	100	12	63	65	24	129	1.70	1.15	1.65	1.25	1.40	1.70	.70
North Carolina.....	158	270	100	234	205	115	323	1.70	1.15	1.55	1.10	1.20	1.30	.70
South Carolina.....	87	133	68	133	89	87	118	1.50	1.20	1.30	1.10	1.25	1.15	.75
Georgia.....	155	257	104	245	155	155	204	1.50	1.05	1.35	1.00	1.05	1.05	.70
Florida.....	54	66	44	52	45	49	59	1.25	1.25	1.15	.95	1.05	1.05	.70
South Atlantic.....	1,063	2,018	779	1,259	1,109	631	1,531	1.29	.81	1.07	1.00	1.02	1.14	.90
Kentucky.....	85	144	34	116	256	58	300	1.35	.95	1.45	1.10	1.00	1.35	.50
Tennessee.....	143	268	125	255	276	142	335	1.50	1.05	1.45	1.05	1.05	1.15	.55
Alabama.....	157	211	83	234	225	316	357	1.40	.90	1.30	1.10	1.15	1.00	.65
Mississippi.....	189	189	120	194	173	212	263	1.30	1.15	1.10	1.10	1.05	.95	.60
Arkansas.....	89	116	70	102	150	94	210	1.45	1.15	1.30	1.20	1.20	1.30	.55
Louisiana.....	74	71	50	69	64	62	82	1.45	1.30	1.40	1.35	1.35	1.30	.90
Oklahoma.....	146	81	120	72	311	66	95	1.60	1.40	1.30	1.30	1.05	1.10	.90
Texas.....	386	580	345	390	510	392	400	1.35	.90	1.25	1.25	1.00	1.10	.80
South Central.....	1,274	1,658	957	1,432	1,965	1,842	2,042	1.41	1.02	1.29	1.16	1.06	1.10	.65
Idaho.....	39	68	50	72	57	71	56	2.10	1.50	1.60	1.35	1.70	1.30	1.10
Colorado.....	510	584	480	185	600	146	335	1.15	.65	1.40	1.05	1.50	1.30	.60
New Mexico.....	56	42	28	27	58	28	33	1.70	1.50	1.70	1.55	1.40	1.45	.80
Arizona.....	14	15	12	15	15	14	15	2.20	2.50	2.50	2.50	2.45	2.10	1.35
Utah.....	25	80	60	87	79	95	49	1.75	1.10	1.70	1.40	1.60	1.25	1.20
Nevada.....	7	6	2	6	3	5	4	2.00	2.00	2.50	2.50	2.55	2.20	2.00
Washington.....	2,300	3,220	1,670	3,700	3,322	4,463	3,650	1.70	.80	1.35	1.05	1.35	.75	.50
Oregon.....	1,500	2,100	1,900	2,700	2,750	3,200	1,995	1.60	.85	1.40	1.00	1.40	.75	.70
California.....	7,542	8,625	7,542	9,355	7,917	11,334	8,917	1.25	.84	1.30	.90	1.65	.55	.58
Western.....	11,993	14,720	11,750	16,147	14,801	19,356	15,124	1.38	.83	1.33	.96	1.53	.65	.58
United States.....	20,720	25,249	18,373	24,212	21,172	25,540	23,009	1.40	.89	1.32	1.02	1.43	.75	.60

Bureau of Agricultural Economics. Production figures are estimates of the crop-reporting board. Prices are based upon returns from crop reporters. Estimates of production for 1929 and 1930 revised on basis of 1930 census. Earlier years not so revised.

<sup>1</sup>In 1925, Nov. 15 price; 1926-1931, approximate average price for the season as reported Dec. 1.

<sup>2</sup>Preliminary.

<sup>3</sup>Includes some quantities not harvested on account of market conditions (1,292,000 bushels in 1930 and 458,000 in 1931.) Prices and value computed on harvested crop.

## STATISTICS OF FRUITS AND VEGETABLES

725

TABLE 228.—*Peas, green, commercial crop: Acreage, production, and price per bushel or per 1,000 pounds 1928-1931*

Utilization and State	Acreage				Production				Seasonal farm price			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
For market.....	<i>Acres</i> 60,300	<i>Acres</i> 68,020	<i>Acres</i> 83,980	<i>Acres</i> 86,550	<i>bush.<sup>1</sup></i> 1,000 5,095	<i>bush.<sup>1</sup></i> 1,000 5,681	<i>bush.<sup>1</sup></i> 1,000 7,006	<i>bush.<sup>1</sup></i> 1,000 6,317	<i>Dolls.</i> 1.71	<i>Dolls.</i> 1.69	<i>Dolls.</i> 1.42	<i>Dolls.</i> 1.42
For manufacture <sup>2</sup> .....					<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>Cts.</i>	<i>Cts.</i>	<i>Cts.</i>	<i>Cts.</i>
Maine.....	1,100	1,150	1,330	1,470	1,980	1,840	2,992	2,102	3.5	3.5	3.5	2.8
New York.....	32,200	32,800	34,440	31,900	48,815	38,360	75,768	41,151	3.0	3.0	3.1	2.7
New Jersey.....	350	400	600	500	770	800	300	715	4.0	3.5	3.5	3.0
Pennsylvania.....	1,680	1,730	2,010	1,920	3,063	4,325	1,809	2,918	3.0	3.0	3.0	2.7
Ohio.....	4,020	5,030	5,410	5,800	6,030	7,545	4,598	8,932	2.7	2.4	2.2	2.1
Indiana.....	5,290	5,500	6,270	5,950	9,797	9,350	13,857	15,827	2.0	2.6	2.6	2.5
Illinois.....	8,740	11,010	12,660	13,100	15,356	18,056	27,852	21,877	2.0	2.5	3.0	2.9
Michigan.....	8,500	10,900	11,660	10,200	13,294	13,625	22,037	10,812	2.0	2.4	2.6	2.5
Wisconsin.....	101,000	111,000	127,000	98,000	203,616	205,350	229,870	107,800	3.0	3.0	2.9	2.7
Minnesota.....	7,920	12,670	17,900	16,500	16,347	21,194	30,967	16,520	2.0	2.7	2.7	2.7
Delaware.....	2,060	3,040	3,200	2,620	3,529	6,536	1,056	4,795	3.0	3.0	3.0	3.0
Maryland.....	10,500	12,400	13,000	13,860	20,475	27,900	6,500	22,730	3.0	3.0	3.0	2.8
Montana.....	3,500	3,900	3,500	2,400	7,560	7,254	8,190	6,000	2.5	2.5	2.3	2.0
Colorado.....	3,000	3,400	3,700	3,500	5,700	6,036	6,734	5,180	2.5	2.2	2.3	2.3
Utah.....	10,150	11,670	13,070	7,200	26,035	26,316	35,942	14,688	3.0	2.6	2.8	2.7
Washington <sup>3</sup> .....	1,940	2,100	2,000	2,000	4,265	5,520	2,400	2,400	2.0	3.0	3.0	2.5
California.....	1,100	880	950	1,000	2,420	799	2,508	2,200	2.5	3.0	3.0	3.0
Other States <sup>4</sup> .....	4,850	3,500	5,100	4,590	8,594	6,510	7,737	8,870	3.0	3.0	3.0	2.9
Total for manufacture.....	205,960	232,920	263,900	222,510	393,381	407,056	483,967	293,517	2.8	2.9	2.9	2.7

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and canning establishments.

<sup>1</sup> Bushels containing approximately 32 pounds, unshelled.

<sup>2</sup> Reported on shelled basis.

<sup>3</sup> Included in other States prior to 1929.

<sup>4</sup> Other States include Idaho, Iowa, Kansas, Tennessee, Virginia, and Wyoming.

TABLE 229.—*Peas, green: Car-load shipments by State of origin, 1925-1931*

State	Crop movement season <sup>1</sup>						
	1925	1926	1927	1928	1929	1930	1931 <sup>2</sup>
New York.....	<i>Cars</i> 885	<i>Cars</i> 1,110	<i>Cars</i> 975	<i>Cars</i> 837	<i>Cars</i> 731	<i>Cars</i> 892	<i>Cars</i> 431
New Jersey.....	20	27	40	38	28	1	13
Maryland.....	48	55	54	68	52	2	14
Virginia.....	303	288	259	281	222	129	232
North Carolina.....	491	596	570	685	363	482	554
South Carolina.....	104	167	207	247	244	265	249
Mississippi.....	149	233	243	250	199	234	285
Idaho.....	13	40	101	176	238	407	415
Colorado.....	35	58	149	348	459	463	556
Washington.....	43	64	111	152	334	791	539
California <sup>3</sup> .....	228	859	1,328	1,529	2,177	3,000	3,628
Other States <sup>4</sup> .....	42	125	109	77	108	134	251
Total.....	2,356	3,622	4,146	4,688	5,160	6,800	7,167

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-load basis.

<sup>1</sup> Crop movement season is for calendar year except for Imperial Valley, California; Florida; and Texas which begins in October of the preceding year.

<sup>2</sup> Preliminary.

<sup>3</sup> Figures for certain States include shipments in preceding year as follows: California, 1926, 4 cars in October, 220 in November, and 94 in December; 1927, 1 car in October, 223 in November, and 33 in December; 1928, 202 cars in November and 92 in December; 1929, 250 cars in November and 145 in December; 1930, 4 cars in October, 138 in November, and 243 in December; 1931, 22 cars in October, 737 in November, and 170 in December. Florida, 1927, 2 cars in December; 1928, 5 cars in November and 4 in December; 1929, 1 car in December; 1931, 1 car in December. Texas, 1927, 1 car in December; 1928, 1 car in November.

TABLE 230.—*Peas, canned: Pack<sup>1</sup> in the United States, 1918-1931*

State	Season														
	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	
	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	1,000 cases	
New York.....	2,000	1,040	2,381	1,382	2,137	2,541	2,931	2,385	2,624	1,668	2,222	1,683	3,164	1,786	
New Jersey <sup>1</sup> .....	332	248	549	345	153	190	331	257	143	267	242	383	74	208	
Ohio.....	442	306	282	241	225	384	430	232	278	205	336	337	208	398	
Indiana.....	454	351	271	182	268	367	453	86	500	90	427	404	564	711	
Illinois.....	978	433	460	331	516	586	697	357	680	563	617	767	1,500	1,003	
Michigan.....	477	425	549	317	455	392	710	451	723	399	542	558	880	434	
Wisconsin.....	4,520	4,317	5,804	4,063	7,042	6,961	10,390	10,003	9,287	6,549	9,248	9,399	10,492	5,057	
Minnesota <sup>1</sup> .....	683	509	696	533	489	591	873	956	840	986	1,030	1,469	1,333	617	
Maryland.....	527	395	595	376	751	918	830	1,346	1,029	802	1,154	1,241	1,062	1,243	
Utah.....	253	205	328	84	496	239	282	271	222	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	
California.....	397	426	402	353	510	516	888	1,040	937	910	1,403	1,363	1,698	1,068	
Other States.....															
U. S. ....	11,063	8,685	12,317	8,207	13,042	13,948	19,315	17,816	17,709	12,936	17,943	18,530	22,035	13,286	

Bureau of Agricultural Economics. Compiled from National Canners' Association, 1918-1926; Bureau of Census, 1927-1929; beginning 1930, Foodstuffs Division, Bureau of Foreign and Domestic Commerce.

<sup>1</sup> Stated in cases of 24 No. 2 cans.

<sup>2</sup> Previous to 1923, included in "Other States."

<sup>3</sup> Includes Delaware.

<sup>4</sup> Included in "Other States."

TABLE 231.—*Pecan trees: Number in specified States, by age groups, 1929<sup>1</sup>*

State	Improved varieties <sup>2</sup>					
	Planted in 1929	1 to 4 years	5 to 9 years	10 to 14 years	15 to 19 years	20 to 24 years
North Carolina.....	22,300	131,100	47,400	33,500	30,700	7,300
South Carolina.....	10,000	187,000	64,000	44,000	30,000	13,000
Georgia.....	109,000	1,014,000	919,000	697,000	482,000	130,000
Florida.....	12,000	156,000	178,000	119,000	60,000	75,000
Alabama.....	49,000	250,000	232,000	145,000	188,000	18,000
Arkansas.....	30,400	143,800	31,700	20,800	14,500	8,500
Mississippi.....	23,400	205,700	142,300	131,800	80,000	24,300
Louisiana.....	9,280	87,350	46,307	33,743	56,518	32,899
Oklahoma.....	100,000	365,000	30,000	5,000	—	—
Texas.....	63,400	386,000	67,300	28,400	101,000	10,000
Total, 11 States.....	428,780	2,895,950	1,755,007	1,255,743	1,042,718	313,999

State	Improved varieties <sup>2</sup>			Seedlings <sup>3</sup>		
	25 to 29 years	30 years and over	Total	Nonbearing age	Bearing age	Total
Missouri.....	—	—	—	178,000	267,000	445,000
North Carolina.....	6,100	600	279,000	10,000	31,000	41,000
South Carolina.....	10,000	7,000	335,000	2,000	23,000	25,000
Georgia.....	51,000	13,000	3,415,000	20,000	70,000	90,000
Florida.....	25,000	3,000	625,000	15,000	50,000	65,000
Alabama.....	9,000	4,000	893,000	5,000	42,000	47,000
Arkansas.....	3,400	2,900	251,000	150,000	400,000	550,000
Mississippi.....	11,100	15,600	633,700	117,800	241,000	358,800
Louisiana.....	8,717	6,188	281,000	177,000	354,000	531,000
Oklahoma.....	—	—	500,000	600,000	1,800,000	2,400,000
Texas.....	900	3,000	660,000	1,540,000	4,480,000	6,000,000
Total, 11 States.....	125,217	55,286	7,872,700	2,814,800	7,738,000	10,552,800

Bureau of Agricultural Economics.

<sup>1</sup> Estimate based upon age distribution shown by 1929 survey supplemented by number of trees of bearing age and nonbearing age reported by the census of 1925.

<sup>2</sup> Improved trees are those that have been grafted, budded, or top worked with scions or buds of improved varieties.

<sup>3</sup> Seedling trees are those grown from the seed, including native wild trees.

## STATISTICS OF FRUITS AND VEGETABLES

727

TABLE 232.—Pecans: Estimated production and December 1 price, by States, 1927-1931

State	Production														
	Improved varieties					Seedling varieties					Total				
	1927	1928	1929	1930	1931 <sup>1</sup>	1927	1928	1929	1930	1931 <sup>1</sup>	1927	1928	1929	1930	1931 <sup>1</sup>
	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.
Ill.....	0	0	0	0	0	90	18	150	200	250	90	18	150	200	250
Mo.....	5	8	18	12	40	488	398	882	593	1,960	493	394	900	600	2,000
N. C.....	427	390	412	384	785	284	240	252	216	815	711	630	664	600	1,050
S. C.....	902	900	476	767	785	255	200	104	157	150	1,157	1,100	580	924	835
Ga.....	2,927	6,780	3,560	3,960	7,820	476	840	440	440	680	3,403	7,000	4,000	4,400	8,500
Fla.....	801	1,600	648	770	1,760	343	500	216	230	440	1,144	2,000	884	1,000	2,200
Ala.....	1,255	2,500	1,345	2,320	3,080	354	500	275	410	420	1,609	3,000	1,620	2,730	3,500
Miss.....	1,120	8,300	1,196	2,816	2,700	2,080	3,000	1,104	2,399	2,300	3,200	6,300	2,300	5,215	5,000
Ark.....	60	95	45	84	168	1,440	1,600	708	1,318	2,632	1,500	1,695	750	1,400	2,800
La.....	398	750	375	880	840	2,253	4,250	2,125	4,620	4,410	2,651	5,000	2,500	5,500	5,250
Okl.....	23	20	74	84	115	4,663	4,420	14,826	11,916	11,385	4,686	4,440	14,900	12,000	11,600
Tex.....	192	765	665	357	960	9,408	26,683	21,498	11,543	31,040	9,600	27,448	22,160	11,900	32,000
U. S.....	8,110	16,988	8,814	12,434	19,003	22,134	42,637	42,574	34,035	55,982	30,244	59,625	51,388	46,469	74,985

## ESTIMATED PRICE PER POUND DECEMBER 1

	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
Ill.....	14.0	15.0	15.0	14.0	8.0	14.0	15.0	15.0	14.0	8.0	14.0	15.0	15.0	14.0	8.0
Mo.....	48.0	35.0	30.0	20.0	15.0	20.0	16.0	13.0	12.0	8.0	20.3	16.5	12.3	12.2	8.2
N. C.....	40.0	36.0	34.0	33.0	20.0	27.0	22.0	20.0	18.0	14.0	34.9	30.6	28.6	27.7	18.2
S. C.....	35.0	33.0	35.0	28.0	17.0	23.0	17.0	20.0	18.0	11.0	32.4	30.1	32.4	26.3	15.9
Ga.....	34.0	28.0	31.0	30.0	12.0	17.0	13.0	15.0	14.0	6.0	31.0	26.3	29.2	26.3	11.5
Fla.....	33.0	31.0	33.0	29.0	14.0	17.0	16.0	17.0	17.0	8.0	28.1	27.2	29.1	26.2	12.8
Ala.....	37.0	30.0	30.0	25.0	14.0	20.0	13.0	16.0	12.0	8.0	33.3	27.2	27.7	23.0	13.3
Miss.....	38.0	30.0	32.0	27.0	14.0	19.0	14.0	17.0	12.0	7.0	25.7	22.4	24.8	20.1	10.8
Ark.....	35.0	32.0	35.0	30.0	15.0	15.0	14.0	12.0	12.0	6.0	15.8	16.0	13.5	13.1	6.5
La.....	38.0	27.0	31.0	24.0	16.0	16.0	10.7	15.0	12.0	7.5	19.3	13.1	17.4	13.9	8.9
Okl.....	35.0	35.0	39.0	30.5	19.0	13.0	11.0	10.2	9.1	5.0	13.1	11.1	10.3	9.2	5.1
Tex.....	35.0	35.0	32.0	27.0	17.0	16.0	11.7	11.0	11.0	5.3	16.4	12.4	11.6	11.5	5.6
U. S.....	35.6	29.7	31.7	27.8	13.8	16.0	12.0	11.3	10.8	5.7	21.2	17.0	14.8	15.3	7.8

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.

TABLE 233.—Plums and prunes: Production and seasonal farm price, by States, 1926-1931

Crop and State	Production						Seasonal farm price					
	1926	1927	1928	1929	1930	1931 <sup>1</sup>	1926	1927	1928	1929	1930	1931
Plums and fresh prunes:	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Dol-lars	Dol-lars	Dol-lars	Dol-lars	Dol-lars	Dol-lars
California.....	71,000	57,000	64,000	40,000	32,000	35,000	25.00	45.00	37.00	90.00	35.00	24.00
Oregon.....	17,500	18,100	25,300	28,500	25,000	21,500	25.00	20.00	25.00	24.50	20.00	20.00
Washington.....	11,300	9,300	19,500	23,750	18,875	11,750	27.00	25.00	28.00	22.50	22.00	21.00
Idaho.....	18,600	21,600	21,700	25,000	22,000	19,500	30.00	27.00	30.00	22.00	22.00	20.00
Total.....	119,400	106,000	132,500	117,250	147,875	117,750	28.01	35.31	32.24	45.90	29.17	22.29
Prunes, dried:	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Dol-lars	Dol-lars	Dol-lars	Dol-lars	Dol-lars	Dol-lars
California.....	150,000	225,000	220,300	103,000	267,000	173,000	100.00	70.00	100.00	155.00	55.00	58.00
Oregon.....	34,000	16,000	5,000	50,000	25,500	27,000	95.00	90.00	160.00	140.00	70.00	75.00
Washington.....	6,250	3,500	900	7,500	3,750	3,750	95.00	95.00	180.00	140.00	70.00	75.00
Idaho.....	-----	-----	84	880	215	-----	-----	-----	150.00	130.00	65.00	-----
Total.....	190,250	244,500	226,284	161,380	296,465	203,750	98.94	71.67	101.58	149.52	56.16	60.56

Bureau of Agricultural Economics.

<sup>1</sup> Preliminary.<sup>2</sup> Seasonal average to Dec. 1.<sup>3</sup> Includes some fruit not harvested on account of market conditions (but not included in computing value) as follows: Plums and fresh prunes, California, 1931, 6,000 tons; prunes, dried, California, 1930, 13,000 tons, Oregon, 1930, 8,000 tons.

TABLE 234.—Potatoes: Acreage, production, value, exports, etc., United States, 1909-1931

Year	Acreage	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value Dec. 1	Whole-sale price per bushel at New York <sup>1</sup>	Domestic exports, year beginning July <sup>2</sup>	Imports year beginning July <sup>2</sup>	Not balance, year beginning July <sup>2</sup>
	1,000 acres	Bushels	1,000 bushels	Cents	1,000 dollars	Cents	1,000 bushels	1,000 bushels	1,000 bushels
1909.....	3,669	106.1	389,195						
1909.....	3,669	107.5	394,552	54.2	213,679	49	999	353	+616
1910.....	3,720	93.8	349,082	55.7	194,566	54	2,384	219	+2,177
1911.....	3,619	80.9	292,737	79.9	233,778	106	1,237	13,735	-12,233
1912.....	3,711	113.4	420,647	50.5	212,650	62	2,028	337	+1,693
1913.....	3,668	90.4	331,525	68.7	227,903	78	1,794	3,646	-1,823
1914.....	3,711	110.5	409,921	48.7	199,460	47	3,135	271	+2,866
1915.....	3,734	98.3	369,721	61.7	221,992	103	4,018	210	+3,810
1916.....	3,585	80.5	286,953	145.1	419,333	238	2,489	3,079	-558
1917.....	4,384	100.8	442,108	122.8	542,774	129	3,453	1,180	+2,273
1918.....	4,285	95.9	411,860	119.3	491,527	127	3,689	3,584	+205
1919.....	3,259	82.3	269,428						
1919.....	3,285	90.7	296,975	158.0	472,289	284	3,728	6,941	-3,212
1920.....	3,302	112.5	371,356	112.8	418,926	103	4,303	3,423	+1,880
1921.....	3,598	91.0	327,365	108.1	353,803	123	2,327	2,110	+222
1922.....	3,943	106.4	419,655	55.7	233,909	97	2,980	572	+2,408
1923.....	3,884	108.6	367,534	75.7	278,251	118	3,075	564	+2,512
1924.....	3,911	121.1	472,463						
1924.....	3,111	124.1	386,219	62.3	240,757	78	3,653	478	+3,187
1925.....	2,825	105.9	299,072	187.2	559,939	238	1,824	5,420	-3,575
1926.....	2,817	114.7	323,085	141.3	456,601	161	2,092	6,349	-4,256
1927.....	3,177	116.6	370,423	95.1	352,375	129	2,424	3,808	-1,383
1928.....	3,474	122.8	426,778	52.7	224,359	76	3,165	2,098	+1,067
1929.....	2,978	110.5	329,134	128.8	423,896	163	2,386	6,006	-3,521
1930.....	3,038	109.7	333,210	89.0	296,505	111	1,548	5,729	-4,155
1931 <sup>3</sup> .....	3,382	111.3	376,248	42.9	161,264				

Bureau of Agricultural Economics. Acreage, yield, and production figures are estimates of the crop reporting board, revised, 1919 to 1928. See introductory text; italic figures are census returns. Prices received by producers are based upon returns from crop reporters. See 1927 Yearbook, p. 881, for data for earlier years.

<sup>1</sup> Compiled from Producers Price Current. Prices 1909-1919 are averages of the high and low weekly quotations of New York potatoes, October-June, converted from dollars per 180 pounds to cents per bushel; beginning 1920, season September-May.

<sup>2</sup> Compiled from Commerce and Navigation of the United States, 1909-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1926, January and June issues, 1927-1930 and official records of the Bureau of Foreign and Domestic Commerce.

<sup>3</sup> The difference between total exports (domestic exports plus reexports) and total imports; + indicates net exports and - indicates net imports.

<sup>4</sup> For some of the early and midseason States prices represent approximate seasonal average.

<sup>5</sup> Preliminary.

TABLE 235.—Potatoes: Car-lot shipments, United States, by months, 1921-1931

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars
1921.....	14,477	12,487	10,449	14,948	14,926	16,421	15,606	16,240	26,322	42,956	16,729	10,440	218,001
1922.....	16,721	13,722	22,334	20,059	20,284	22,104	18,833	18,299	24,420	35,193	21,050	12,448	245,407
1923.....	17,262	14,609	24,468	23,199	18,302	20,295	16,733	16,735	24,063	35,223	20,737	11,977	241,003
1924.....	19,762	20,718	22,940	19,451	18,736	20,845	23,636	16,394	21,387	34,141	20,852	13,237	252,097
1925.....	21,715	20,394	21,639	20,123	20,215	19,798	17,705	14,864	23,569	33,631	16,268	11,524	241,523
1926.....	16,185	14,834	19,974	14,238	16,903	23,587	20,310	15,327	22,978	36,182	18,419	13,487	232,424
1927.....	17,974	17,784	21,497	20,283	16,691	22,155	21,053	17,833	25,003	38,333	21,124	13,695	253,445
1928.....	20,278	22,913	23,710	27,255	23,740	29,675	21,048	16,252	21,127	29,908	18,232	13,207	257,343
1929.....	20,096	20,472	23,059	20,153	20,380	24,813	19,583	17,395	24,441	31,958	15,709	15,158	253,194
1930.....	20,302	19,918	22,108	19,789	22,803	25,004	22,326	16,775	22,415	29,076	16,502	15,413	252,411
1931 <sup>1</sup> .....	21,241	20,312	23,885	21,481	24,072	27,264	20,379	11,977	17,457	24,410	14,346	13,109	239,913

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis, 400 to 700 bushels to a carload.

<sup>1</sup> Preliminary.

TABLE 236.—Potatoes: Acreage and production, by States, average 1924-1928, annual 1928-1931

State and division	Acreage					Production				
	Average 1924- 1928	1928	1929	1930	1931 <sup>1</sup>	Average 1924- 1928	1928	1929	1930	1931 <sup>1</sup>
	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>	<i>1,000 bush.</i>
Maine.....	143	179	171	181	196	37,684	39,380	49,932	45,250	50,960
New Hampshire.....	10	10	8	9	9	1,278	1,100	1,160	1,065	1,185
Vermont.....	19	17	15	15	17	2,234	2,040	1,875	2,475	2,550
Massachusetts.....	14	14	11	11	13	1,501	1,260	1,155	1,870	1,625
Rhode Island.....	2	2	2	2	2	244	220	254	380	300
Connecticut.....	14	12	11	11	12	1,554	1,380	1,257	1,625	1,920
New York.....	245	232	218	198	202	28,963	27,608	21,813	23,864	28,034
New Jersey.....	53	47	38	37	41	7,475	7,765	4,902	7,311	7,831
Pennsylvania.....	200	210	195	189	191	22,872	26,670	20,865	17,955	26,549
North Atlantic.....	704	723	664	653	683	103,224	107,413	102,943	102,395	121,904
Ohio.....	108	119	105	105	110	10,285	11,424	10,080	9,240	11,220
Indiana.....	49	55	50	51	54	4,536	5,775	4,200	4,589	4,930
Illinois.....	53	53	47	50	55	4,765	5,830	3,948	3,900	4,675
Michigan.....	243	271	225	227	250	26,510	31,438	18,975	14,301	23,750
Wisconsin.....	240	273	215	239	268	26,308	30,576	20,640	13,164	24,924
Minnesota.....	321	379	330	314	361	33,855	41,811	25,740	22,608	28,890
Iowa.....	78	81	77	70	81	7,588	10,368	7,700	4,900	4,455
Missouri.....	54	59	50	48	49	4,776	7,139	3,950	4,948	3,675
North Dakota.....	96	123	121	97	114	8,422	12,177	6,776	6,305	8,438
South Dakota.....	52	60	56	58	54	4,594	5,780	4,200	3,654	2,160
Nebraska.....	95	119	101	101	131	7,999	10,829	9,393	9,595	6,812
Kansas.....	48	50	44	42	46	4,931	7,500	3,960	4,788	3,634
North Central.....	1,436	1,642	1,421	1,402	1,577	144,538	180,125	116,562	106,842	127,551
Delaware.....	5	5	4	4	5	471	470	344	200	540
Maryland.....	35	36	30	30	32	3,664	4,320	3,390	2,520	3,360
Virginia.....	115	121	103	117	118	15,357	18,876	15,244	13,689	14,180
West Virginia.....	36	38	36	38	40	3,540	4,560	3,780	2,394	3,200
North Carolina.....	61	83	62	76	70	6,136	9,379	6,138	7,220	8,532
South Carolina.....	26	29	20	21	25	3,019	3,451	2,600	2,835	3,550
Georgia.....	12	14	13	15	18	761	924	884	1,065	1,224
Florida.....	27	32	23	22	28	3,056	4,000	2,714	2,560	3,640
South Atlantic.....	318	358	291	333	345	36,004	45,980	35,094	32,483	38,206
Kentucky.....	48	56	49	44	55	4,442	6,440	4,655	2,772	3,980
Tennessee.....	38	43	39	41	57	2,897	3,784	3,159	2,419	3,021
Alabama.....	26	31	22	28	39	1,925	2,356	1,694	2,184	3,606
Mississippi.....	9	10	9	9	14	603	790	702	594	1,134
Arkansas.....	30	36	29	31	43	2,053	2,844	2,494	2,697	3,784
Louisiana.....	32	38	29	34	48	1,900	2,546	1,653	2,316	3,936
Oklahoma.....	39	52	39	38	45	2,875	3,744	2,925	3,496	3,240
Texas.....	36	48	42	57	67	2,379	3,072	2,982	4,788	4,891
South Central.....	257	314	258	282	368	19,074	25,676	20,264	21,296	27,632
Montana.....	22	23	21	18	19	2,343	2,645	1,869	1,764	1,805
Idaho.....	54	104	82	98	110	16,503	19,138	15,418	24,500	24,200
Wyoming.....	15	22	20	23	32	1,688	2,310	1,840	3,450	3,380
Colorado.....	85	114	90	92	101	13,511	17,670	14,670	17,480	9,595
New Mexico.....	3	4	4	5	5	190	280	320	350	385
Arizona.....	3	3	2	3	8	219	222	170	255	255
Utah.....	13	14	11	12	15	1,832	2,015	2,035	2,160	1,950
Nevada.....	5	6	4	3	3	694	700	560	510	300
Washington.....	53	54	44	48	44	9,144	9,180	7,260	7,680	6,820
Oregon.....	37	41	33	33	42	4,108	5,048	3,366	5,115	5,480
California.....	46	53	33	33	35	8,066	8,490	6,765	6,930	6,825
Western.....	366	437	344	368	409	58,275	67,682	54,271	70,194	60,955
United States.....	3,061	3,474	2,978	3,038	3,382	361,115	426,776	320,134	333,210	376,248

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

<sup>1</sup>Preliminary.

TABLE 237.—Potatoes: Yield per acre and estimated price per bushel December 1, by States, averages, and annual 1928-1931

State and division	Yield per acre							Estimated price per bushel <sup>1</sup>						
	Av., 1919- 1928	1926	1927	1928	1929	1930	1931	Av., 1925- 1929	1926	1927	1928	1929	1930	1931
	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
Maine.....	248	285	230	220	292	260	260	116	133	85	40	120	65	20
New Hampshire.....	120	130	125	110	145	185	165	187	170	140	80	160	105	60
Vermont.....	120	125	125	120	125	165	150	143	140	125	55	150	90	50
Massachusetts.....	110	125	85	90	105	170	125	170	180	155	90	180	110	65
Rhode Island.....	116	150	100	110	127	190	150	170	180	155	90	180	115	65
Connecticut.....	111	130	90	115	117	175	160	173	180	165	90	180	115	65
New York.....	114	120	112	119	101	118	142	142	160	125	65	145	90	40
New Jersey <sup>1</sup> .....	136	145	161	165	129	203	191	141	155	110	50	160	95	60
Pennsylvania.....	106	107	110	127	107	95	139	142	170	120	65	160	115	45
North Atlantic.....	138.1	151.7	141.8	148.6	155.0	156.8	178.5	132.3	152.0	108.7	56.0	137.8	84.9	35.3
Ohio.....	88	92	101	96	96	88	102	144	170	120	75	155	110	55
Indiana.....	81	85	95	105	84	89	85	142	165	110	70	160	115	55
Illinois.....	76	80	84	110	84	78	85	140	175	115	65	155	125	65
Michigan.....	104	121	84	116	71	63	95	107	120	90	40	125	85	30
Wisconsin.....	104	114	92	112	96	76	93	106	120	85	35	120	80	30
Minnesota.....	96	98	99	109	78	72	80	92	115	60	30	100	65	30
Iowa.....	87	79	82	128	100	70	55	139	170	100	61	140	130	60
Missouri.....	80	80	83	121	79	101	75	144	170	115	60	160	100	70
North Dakota.....	82	77	97	99	56	65	74	91	120	50	30	105	80	30
South Dakota.....	81	65	115	96	75	63	40	110	159	55	40	115	95	45
Nebraska.....	80	70	101	91	93	95	52	115	160	75	50	110	85	50
Kansas.....	88	91	110	180	90	114	79	138	170	100	45	140	90	60
North Central.....	92.6	97.0	94.2	109.7	82.0	76.2	80.9	111.6	134.0	81.9	42.4	122.7	87.8	38.8
Delaware.....	87	86	119	94	86	50	108	131	140	80	75	160	115	55
Maryland <sup>1</sup> .....	103	94	133	120	113	84	105	122	140	105	50	125	95	55
Virginia <sup>1</sup> .....	121	105	161	156	148	117	120	128	140	130	50	120	100	55
West Virginia.....	97	100	105	120	105	63	80	141	167	125	80	125	130	80
North Carolina <sup>1</sup> .....	94	93	97	113	99	95	108	135	160	150	65	105	120	60
South Carolina <sup>1</sup> .....	115	126	99	119	130	135	142	155	170	190	65	135	130	70
Georgia <sup>1</sup> .....	65	64	70	66	68	71	68	164	190	165	115	140	135	95
Florida <sup>1</sup> .....	105	118	103	125	118	80	130	215	300	185	150	180	185	110
South Atlantic.....	106.8	101.9	123.9	128.4	120.6	97.5	110.7	138.5	165.7	138.3	67.4	125.0	116.8	66.1
Kentucky <sup>1</sup> .....	83	89	90	115	95	63	72	140	155	130	80	130	125	75
Tennessee <sup>1</sup> .....	73	77	85	88	81	59	53	142	167	135	90	120	125	85
Alabama <sup>1</sup> .....	74	72	73	76	77	78	94	168	190	150	85	145	145	70
Mississippi <sup>1</sup> .....	71	66	72	79	78	66	81	164	180	165	120	155	140	75
Arkansas <sup>1</sup> .....	69	59	68	79	86	87	88	163	185	150	60	125	115	55
Louisiana <sup>1</sup> .....	59	57	53	67	67	69	82	162	190	165	100	145	135	50
Oklahoma <sup>1</sup> .....	71	73	73	72	75	92	72	156	170	150	75	120	110	60
Texas <sup>1</sup> .....	63	73	65	64	71	84	73	171	200	165	100	150	150	80
South Central.....	71.1	72.4	73.3	81.5	78.5	75.5	75.1	151.6	174.6	151.4	86.8	132.7	130.5	68.3
Montana.....	107	85	140	115	89	98	95	114	190	65	55	170	110	60
Idaho.....	137	185	230	184	188	250	220	94	105	55	45	120	60	30
Wyoming.....	108	110	130	105	92	150	105	110	125	70	65	130	75	45
Colorado.....	145	145	165	165	163	190	95	99	130	55	45	110	60	30
New Mexico.....	56	70	75	70	80	70	77	148	175	120	95	160	115	70
Arizona.....	74	55	80	74	85	85	85	164	200	110	110	170	125	120
Utah.....	150	145	135	144	185	180	130	92	105	75	45	100	60	40
Nevada.....	145	140	136	140	140	170	100	128	130	85	85	160	110	60
Washington.....	161	180	195	170	165	160	155	103	95	60	50	145	75	40
Oregon.....	108	106	120	123	102	155	130	107	100	75	70	140	85	50
California <sup>1</sup> .....	161	175	175	160	205	210	195	126	132	95	65	135	110	72
Western.....	148.5	152.5	176.6	154.9	157.8	190.7	149.0	103.3	113.8	63.9	52.0	125.7	71.3	40.4
United States.....	109.3	114.7	116.6	122.8	110.5	109.7	111.8	121.0	141.3	95.1	52.7	123.8	89.0	42.9

Bureau of Agricultural Economics. Yield figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text. Prices are based upon returns from crop reporters.

<sup>1</sup> Prices shown for years 1926-1931 in early and mid-season States marked represent approximate seasonal average.

TABLE 238.—Potatoes: Acreage, yield per acre, and production in specified countries, average 1925-26 to 1929-30, annual 1930-31 and 1931-32

Country	Acreage			Yield per acre			Production		
	Average 1925-26 to 1929-30	1930-31	1931-32 <sup>1</sup>	Average 1925-26 to 1929-30	1930-31	1931-32 <sup>1</sup>	Average 1925-26 to 1929-30	1930-31	1931-32 <sup>1</sup>
<b>NORTHERN HEMISPHERE</b>									
North America:	1,000 acres	1,000 acres	1,000 acres	Bush- els	Bush- els	Bush- els	1,000 bushels	1,000 bushels	1,000 bushels
Canada.....	552	571	534	135.1	140.8	149.3	74,579	80,402	87,175
United States.....	3,297	3,038	3,382	113.6	109.7	111.3	374,520	333,210	376,218
Total.....	3,849	3,609	3,966	116.7	114.6	116.8	449,099	413,612	463,423
Europe:									
United Kingdom.....	800	684	709	248.1	243.4	-----	198,501	166,486	-----
Irish Free State.....	309	247	346	238.1	251.5	-----	87,856	87,265	-----
Norway.....	120	117	116	263.3	240.5	261.6	31,592	28,144	30,344
Sweden.....	366	336	327	178.2	196.8	157.3	63,397	66,112	51,440
Denmark.....	173	187	156	209.5	216.6	212.0	36,243	36,170	33,069
Netherlands.....	433	397	401	280.0	281.3	235.7	121,249	111,691	94,496
Belgium.....	408	402	402	305.4	270.8	252.7	124,585	108,848	101,580
France.....	3,008	3,499	3,516	145.4	141.0	108.4	524,505	493,426	532,194
Spain.....	<sup>2</sup> 812	915	-----	172.0	168.8	-----	<sup>2</sup> 139,671	154,438	124,162
Italy.....	868	863	574	83.9	83.2	63.2	72,837	71,794	55,262
Switzerland.....	116	120	113	224.7	180.7	249.2	26,069	21,679	28,144
Germany.....	6,945	6,930	6,979	201.7	249.7	230.9	1,400,991	1,730,596	1,611,797
Austria.....	453	466	479	183.7	209.2	181.3	83,216	97,483	86,865
Czechoslovakia.....	1,738	1,639	1,779	178.4	200.7	177.7	310,025	328,869	316,062
Hungary.....	622	673	710	110.8	100.5	76.2	72,231	67,661	54,074
Yugoslavia.....	560	599	-----	74.4	90.2	-----	41,649	54,031	-----
Rumania.....	644	632	683	117.8	113.8	127.8	75,865	71,941	<sup>3</sup> 87,302
Poland.....	6,125	6,602	6,715	158.7	172.0	179.9	972,152	1,135,455	1,208,113
Lithuania.....	347	403	409	155.1	172.2	188.7	53,810	69,404	77,161
Latvia.....	200	231	247	142.4	175.6	163.6	28,477	40,568	40,410
Estonia.....	166	168	167	158.1	188.8	173.6	26,245	31,714	28,999
Finland.....	171	175	174	180.9	164.9	153.0	27,521	28,857	26,621
Russia.....	13,476	14,378	14,838	119.0	131.0	-----	1,604,067	1,883,096	-----
Total European countries reporting area and production all years.....	23,533	23,820	24,247	172.1	190.6	186.6	4,051,000	4,540,412	4,523,953
Estimated European total, excluding Russia.....	26,200	26,500	27,000	-----	-----	-----	4,533,000	5,035,000	4,967,000
Total Northern Hemisphere countries reporting area and production all years.....	27,382	27,429	28,213	164.3	180.6	176.8	4,500,099	4,954,024	4,987,376
Estimated Northern Hemisphere total, excluding Russia and China.....	30,900	31,100	31,800	-----	-----	-----	5,056,000	5,521,000	5,550,000
<b>SOUTHERN HEMISPHERE</b>									
Chile.....	93	111	101	145.8	148.1	-----	13,557	16,485	-----
Argentina.....	297	-----	-----	97.7	-----	-----	29,031	-----	-----
Australia.....	140	-----	-----	95.1	-----	-----	13,315	-----	-----
Estimated Southern Hemisphere total.....	1,600	2,200	-----	-----	-----	-----	93,000	92,000	-----
Estimated world total, excluding Russia and China.....	32,500	33,300	-----	-----	-----	-----	5,149,000	5,613,000	-----

Bureau of Agricultural Economics. Both acreage and production figures refer to the year of harvest. Harvests of the Northern Hemisphere are combined with those of the Southern Hemisphere which immediately follow; thus for 1930-31 the crop harvested in the Northern Hemisphere countries in 1930 is combined with the Southern Hemisphere harvest which begins late in 1930 and ends early in 1931.

<sup>1</sup> Preliminary.

<sup>2</sup> 4-year average.

<sup>3</sup> Does not include potatoes grown with other crops.

TABLE 239.—Potatoes, early commercial crop: Acreage, production, and price per bushel, by States, 1928-1931

Group and State	Acreage				Production				Seasonal farm price per bushel			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	<i>Acres</i> 300	<i>Acres</i> 750	<i>Acres</i> 650	<i>Acres</i> 3,500	<i>1,000</i> <i>bush.</i> <sup>1</sup> 18	<i>1,000</i> <i>bush.</i> <sup>1</sup> 38	<i>1,000</i> <i>bush.</i> <sup>1</sup> 51	<i>1,000</i> <i>bush.</i> <sup>1</sup> 245	<i>Dolla.</i> 1.42	<i>Dolla.</i> 1.05	<i>Dolla.</i> 1.80	<i>Dolla.</i> 1.05
Fall: Texas.....												
Early (sec. 1):												
Florida.....	30,000	22,000	31,000	26,900	3,751	2,587	2,489	3,559	1.49	1.81	1.88	1.07
South.....	7,000	4,840	4,800	4,300	350	348	418	366	2.10	2.20	2.50	1.80
North.....	23,000	17,360	26,200	22,600	3,401	2,239	2,071	3,193	1.43	1.75	1.73	1.01
Hastings.....	20,800	18,820	22,500	18,800	3,120	2,057	1,710	2,548	1.44	1.75	1.75	1.04
La Crosse.....	1,850	1,190	3,200	3,000	223	189	320	405	1.41	1.74	1.65	1.00
West.....	350	350	500	1,000	53	23	41	150	.75	1.52	1.48	.52
Texas, lower Rio Grande valley.....	10,520	9,800	15,000	13,650	736	980	1,530	996	1.72	1.65	1.75	1.31
Group total.....	40,520	31,800	46,000	40,550	4,457	3,567	4,019	4,555	1.53	1.76	1.82	1.12
Early (sec. 2):												
Alabama.....	17,700	7,500	11,800	14,600	1,504	668	1,180	2,044	.75	1.45	1.45	.48
California.....	22,650	10,300	11,300	15,700	2,741	1,339	2,090	2,590	.61	1.22	1.20	.87
Georgia.....	2,500	1,200	2,200	2,500	225	156	330	450	.80	1.35	1.40	.05
Louisiana.....	21,800	15,000	22,000	30,800	1,526	900	1,650	2,834	1.00	1.50	1.35	.50
Mississippi.....	1,000	700	900	1,900	90	61	66	205	1.12	1.45	1.53	.47
South Carolina.....	24,000	15,000	16,600	17,700	3,360	2,130	2,490	2,920	.56	1.30	1.28	.67
Texas.....	13,590	8,990	15,950	19,300	895	520	1,425	1,760	.70	1.30	1.27	.63
Engle Lake-Sugarland-Wharton.....	9,550	7,060	10,350	12,400	621	353	932	1,091	.74	1.38	1.30	.68
Other counties.....	4,030	1,900	5,600	6,900	274	187	493	669	.61	1.12	1.21	.55
Group total.....	103,230	58,660	80,750	102,500	10,341	5,774	9,231	12,803	.69	1.33	1.30	.63
Second early:												
Arkansas.....	6,030	3,440	4,700	6,500	555	310	494	552	.53	1.00	1.15	.45
Maryland.....	11,500	9,000	10,400	9,000	1,883	1,440	1,290	1,170	.33	1.20	.85	.43
North Carolina.....	46,400	27,500	31,500	33,500	6,403	3,438	4,410	5,192	.54	1.00	1.30	.52
Oklahoma.....	17,000	12,000	11,000	11,750	1,428	1,080	1,408	999	.37	.95	1.10	.50
Tennessee.....	2,000	1,500	1,700	2,200	228	156	186	99	.60	1.16	1.20	.65
Virginia.....	90,900	68,600	81,700	76,810	15,908	11,636	11,893	10,620	.41	1.17	.98	.55
Norfolk district.....	14,000	10,700	12,400	11,150	2,100	1,498	1,736	1,617	.41	1.15	1.15	.53
Eastern Shore.....	71,700	54,000	65,000	61,100	13,049	9,612	9,555	8,371	.41	1.18	.94	.55
Other.....	5,200	3,900	4,300	4,560	754	526	602	638	.41	1.14	1.10	.59
Group total.....	173,830	122,040	141,000	139,760	28,380	18,060	19,631	18,638	.44	1.13	1.06	.53
Intermediate:												
Kansas.....	18,760	15,800	15,300	16,300	3,613	1,965	2,724	2,138	.25	1.11	.71	.51
Kaw Valley.....	18,160	13,900	14,800	15,500	3,505	1,585	2,574	1,938	.25	1.09	.70	.49
Scott County.....	600	1,900	1,000	800	108	380	150	200	.40	1.25	.90	.75
Kentucky.....	5,340	4,270	5,250	5,200	1,041	705	843	468	.38	1.35	.90	.89
Missouri.....	6,400	4,610	5,070	5,320	1,280	553	1,039	718	.38	1.10	.80	.63
Nebraska.....	1,900	1,750	1,650	1,600	285	262	280	416	.50	1.20	1.10	.70
New Jersey.....	35,000	29,000	29,000	32,000	6,670	3,915	6,235	6,400	.48	1.60	.88	.60
Group total.....	67,400	55,430	56,270	60,420	11,889	7,400	10,619	10,140	.38	1.40	.84	.69
Total, all States.....	385,280	268,680	324,670	346,730	53,118	34,839	43,551	46,381	.57	1.28	1.13	.63

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

<sup>1</sup> Bushels containing approximately 60 pounds.

## STATISTICS OF FRUITS AND VEGETABLES

733

TABLE 240.—Potatoes: *International trade, average 1925-1929, annual 1927-1930*

Country	Calendar year									
	Average 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
<b>PRINCIPAL EXPORTING COUNTRIES</b>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>
Netherlands.....	17,967	659	16,937	743	17,833	1,251	21,077	353	20,662	373
Belgium.....	9,012	5,090	8,951	3,813	14,027	4,197	10,904	8,122	9,726	9,477
Italy.....	7,761	1,933	8,294	505	7,612	4,285	5,642	4,223	4,853	1,590
Canada.....	7,118	688	7,687	504	6,309	708	7,145	1,189	7,128	844
Poland.....	3,555	12	5,103	8	2,929	8	3,240	8	1,478	4
Hungary.....	2,778	262	2,663	210	2,255	435	2,716	464	1,895	92
Spain.....	2,341	1,226	1,931	949	2,624	1,800	3,602	1,917	2,576	762
Argentina.....	2,138	213	2,966	33	1,901	42	2,338	482	2,618	553
Algeria.....	1,475	1,413	1,152	1,381	1,396	1,733	1,479	1,423	1,552	1,898
Czechoslovakia.....	1,062	951	2,729	1,498	1,208	534	1,147	438	347	443
Estonia.....	886	1	1,310	3	1,380	1	490	0	412	0
Irish Free State.....	865	647	1,018	566	1,351	322	579	762	333	535
Russia <sup>2</sup> .....	756	9	1,066	6	2,495	157	157	1	1	1
Japan.....	606	0	733	0	734	0	603	0	752	0
China.....	193	0	124	0	187	0	312	0	365	0
<b>Total.....</b>	<b>58,808</b>	<b>13,104</b>	<b>60,714</b>	<b>10,224</b>	<b>64,241</b>	<b>15,326</b>	<b>61,431</b>	<b>19,426</b>	<b>54,636</b>	<b>16,946</b>
<b>PRINCIPAL IMPORTING COUNTRIES</b>										
Germany.....	5,346	16,623	2,537	23,484	6,684	17,956	4,170	11,305	3,671	11,755
United Kingdom.....	2,779	14,071	3,039	10,338	1,854	17,727	5,450	10,844	2,066	10,736
France.....	9,850	12,205	9,347	9,821	12,653	14,422	8,715	15,538	7,550	9,191
United States.....	2,434	4,264	2,379	5,272	2,698	3,710	2,735	4,276	1,899	5,060
Cuba.....	75	3,903	78	4,076	151	3,616	90	3,428	83	2,393
Austria.....	865	2,596	194	2,424	3,001	2,066	966	2,401	223	1,625
Switzerland.....	4	2,326	3	1,887	5	2,822	3	2,044	1	3,336
Portugal.....	120	1,748	46	1,403	59	2,397	70	2,363	2	2,489
Uruguay.....	1	1,493	1	1,452	2	1,210	0	1,587	1	1,846
Brazil.....	0	1,182	0	1,314	0	1,023	0	1,488	0	1,093
Egypt.....	139	845	101	853	247	753	195	949	43	765
Denmark.....	67	719	47	740	38	1,981	46	301	38	341
Finland.....	1	624	2	327	0	738	0	928	0	256
Yugoslavia.....	98	469	82	519	67	652	29	938	67	84
Sweden.....	36	422	158	615	1	1,082	0	32	1	74
Tunis.....	2	411	2	436	3	409	1	489	2	510
Philippine Islands.....	0	365	0	345	0	352	0	406	0	340
Venezuela.....	0	161	0	142	0	228	0	278	0	-----
Norway.....	44	62	87	52	15	99	24	3	21	1
<b>Total.....</b>	<b>21,861</b>	<b>64,492</b>	<b>18,103</b>	<b>63,000</b>	<b>27,478</b>	<b>73,273</b>	<b>22,494</b>	<b>59,593</b>	<b>15,729</b>	<b>51,895</b>

Bureau of Agricultural Economics. Official sources except where otherwise noted. These figures do not include sweetpotatoes.

<sup>1</sup> Preliminary.<sup>2</sup> International Yearbook of Agricultural Statistics.<sup>3</sup> 3-year average.TABLE 241.—Potatoes: *Estimated average price per bushel received by producers United States, 1922-23 to 1931-32*

Crop year	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	Weighted average
1922-23.....	Cents 109.0	Cents 101.4	Cents 78.8	Cents 66.2	Cents 80.5	Cents 58.8	Cents 62.0	Cents 64.2	Cents 68.6	Cents 77.4	Cents 79.0	Cents 79.8	Cents 73.3
1923-24.....	102.9	120.8	109.6	91.4	82.5	81.5	88.4	88.1	87.8	91.1	91.3	100.7	94.6
1924-25.....	109.0	111.3	81.0	68.8	63.5	64.1	70.2	72.3	71.4	70.5	70.6	84.4	77.9
1925-26.....	125.5	155.4	121.1	126.6	198.4	201.5	220.5	226.0	225.6	270.5	244.8	190.1	183.4
1926-27.....	174.6	140.5	130.6	126.4	141.3	137.0	139.1	134.1	127.0	126.8	146.0	191.0	142.0
1927-28.....	183.1	146.3	107.4	97.9	95.4	94.1	93.6	99.2	113.1	116.8	103.3	83.6	108.1
1928-29.....	77.4	71.9	64.8	58.0	56.9	57.7	58.9	59.5	58.4	55.3	58.3	63.7	62.0
1929-30.....	88.0	139.1	136.0	138.2	134.8	135.3	137.8	139.1	136.3	145.8	149.9	145.6	136.1
1930-31.....	129.4	108.8	109.9	101.4	95.0	89.8	90.3	86.7	84.9	90.8	87.0	75.3	95.5
1931-32.....	82.5	76.7	60.1	45.8	45.3	45.7	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by car-load shipments. Mean of prices reported on 1st of month and 1st of succeeding month, July, 1922-December, 1923. For previous data see 1930 or earlier Yearbooks.

TABLE 242—Potatoes: Average price<sup>1</sup> per 100 pounds in car lots to jobbers, Chicago, 1922-23 to 1931-32

Crop season <sup>2</sup>	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1922-23	4.48	3.80	3.11	2.21	1.84	1.18	1.00	.88	.88	.91	.96	1.17	1.27	1.02
1923-24	4.80	3.21	2.78	2.18	1.69	1.06	.99	1.06	1.40	1.34	1.36	1.32	1.32	1.27
1924-25	6.37	2.88	2.51	1.80	1.39	1.32	.96	.98	1.20	1.13	1.11	1.09	.84	1.16
1925-26	4.75	3.42	2.96	2.21	2.68	1.99	2.66	3.45	3.65	4.03	3.74	4.01	4.51	3.09
1926-27	8.59	6.67	3.91	2.35	2.22	2.45	2.47	2.41	2.23	2.28	1.98	1.96	2.11	3.18
1927-28	4.52	4.45	4.65	2.30	2.02	1.70	1.53	1.53	1.53	1.62	1.78	2.17	1.85	1.40
1928-29	5.95	2.94	1.74	1.15	1.06	1.04	.91	.89	1.92	1.00	1.00	.85	.71	.81
1929-30	3.94	4.04	2.71	2.78	2.43	2.49	2.40	2.31	2.34	2.57	2.49	2.44	2.87	2.76
1930-31	4.48	3.57	3.01	1.82	1.89	2.10	1.77	1.62	1.55	1.63	1.50	1.59	1.66	1.29
1931-32	4.45	2.30	1.56	1.58	1.45	1.05	.90	.92	1.02					

Bureau of Agricultural Economics. Compiled from daily market reports from bureau representatives in the various markets. Average prices as shown are based on stock of U. S. No. 1 grade; they are simple averages of daily range of selling prices. In some cases conversions were made from larger to smaller units, or vice versa, in order to obtain comparability.

<sup>1</sup> Prices do not include Russet Burbanks.

<sup>2</sup> Crop-movement season extends from April of one year through May of the following year, with irregular quotations continuing through June and July.

<sup>3</sup> Less-than-car-lot-sales to jobbers.

TABLE 243.—Sweetpotatoes: Acreage and production, by States, average 1924-1928, annual 1928-1931

State	Acreage					Production				
	Average, 1924-1928	1928	1929	1930	1931 <sup>1</sup>	Average, 1924-1928	1928	1929	1930	1931 <sup>1</sup>
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 acres	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.	1,000 bush.
New Jersey	13	13	12	12	13	1,696	1,690	1,500	1,440	1,950
Indiana	2	8	3	2	4	275	345	390	190	540
Illinois	6	5	5	5	6	498	450	480	400	636
Iowa	2	2	2	3	3	192	230	168	285	300
Missouri	8	8	10	9	10	772	760	900	765	900
Kansas	4	4	4	5	6	510	540	480	525	570
Delaware	6	6	6	7	8	809	870	888	525	1,400
Maryland	8	9	9	9	11	1,348	1,710	1,629	630	2,013
Virginia	35	36	36	37	38	4,651	5,184	5,076	2,960	4,750
North Carolina	64	62	60	75	80	6,185	6,076	6,720	6,750	6,590
South Carolina	44	46	47	49	53	3,392	3,910	5,029	4,655	3,180
Georgia	86	84	85	79	91	6,273	6,132	7,905	6,320	4,550
Florida	21	20	20	19	21	1,813	1,700	1,820	1,520	2,038
Kentucky	15	14	14	13	21	1,257	1,120	1,274	845	2,100
Tennessee	49	50	54	54	68	4,820	4,700	5,508	4,535	5,440
Alabama	64	64	68	68	78	5,470	6,080	6,664	5,780	5,304
Mississippi	52	49	53	45	63	4,677	4,900	6,148	3,825	5,355
Arkansas	26	23	22	23	32	2,565	2,070	1,870	1,932	2,880
Louisiana	64	62	67	60	72	4,687	4,650	4,958	4,200	5,400
Oklahoma	16	18	16	17	19	1,883	1,602	1,344	1,190	1,330
Texas	44	48	45	47	69	3,424	3,744	3,420	3,290	4,968
Arizona	1	1				133	142			
California	10	11	8	10	12	957	1,045	792	1,100	1,140
United States	642	638	646	648	778	57,956	59,650	64,963	53,663	62,904

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text.

<sup>1</sup> Preliminary

## STATISTICS OF FRUITS AND VEGETABLES

735

TABLE 244.—*Sweetpotatoes: Acreage, production, and value, United States, 1919-1931*

Year	Acreage	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value Dec. 1	Year	Acreage	Average yield per acre	Production	Price per bushel received by producers Dec. 1	Farm value Dec. 1
	1,000 acres	Bushels	1,000 bushels	Cents	1,000 dollars		1,000 acres	Bushels	1,000 bushels	Cents	1,000 dollars
1919.....	792	99.0	78,422	133.6	104,746	1925.....	637	78.9	50,241	134.9	67,752
1920.....	768	100.4	77,124	112.9	87,072	1926.....	646	98.3	63,631	93.8	59,612
1921.....	819	90.3	73,988	88.2	65,204	1927.....	724	98.3	71,156	82.7	58,856
1922.....	819	96.1	78,665	76.6	60,262	1928.....	638	93.5	59,650	90.9	54,218
1923.....	675	94.9	64,041	98.1	62,831	1929.....	646	100.6	64,963	93.9	60,982
1924.....	467	80.8	37,444	.....	.....	1930.....	648	82.8	53,663	90.0	48,232
1925.....	567	79.7	45,201	127.4	57,600	1931 <sup>1</sup> .....	778	80.9	62,904	57.4	36,132

Bureau of Agricultural Economics. Acreage, yield, and production figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text; italic figures are census returns. Prices are based upon returns from crop reporters.

<sup>1</sup> Preliminary.

TABLE 245.—*Sweetpotatoes: Yield per acre and estimated price per bushel December 1, by States, averages, and annual 1926-1931*

State	Yield per acre							Estimated price per bushel Dec. 1						
	Average, 1919-1928	1926	1927	1928	1929	1930	1931	Average, 1926-1929	1926	1927	1928	1929	1930	1931
	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
New Jersey.....	124	135	110	130	125	120	150	148	120	120	120	140	120	70
Indiana.....	118	120	110	115	130	95	135	147	145	135	130	135	135	70
Illinois.....	90	100	90	90	96	80	106	136	135	115	110	130	115	60
Iowa.....	91	95	85	115	84	95	100	181	200	150	155	170	180	90
Missouri.....	96	104	101	95	90	85	90	128	130	120	105	120	110	75
Kansas.....	122	125	135	135	120	105	95	132	135	110	110	135	110	75
Delaware.....	135	140	115	145	148	75	175	99	65	70	80	90	90	35
Maryland.....	146	165	165	190	181	70	183	97	75	70	80	90	90	50
Virginia.....	130	125	140	144	141	80	125	95	100	85	70	90	100	35
North Carolina.....	100	91	114	98	112	90	82	95	100	80	85	90	90	55
South Carolina.....	84	77	97	85	107	95	60	99	100	80	85	85	80	65
Georgia.....	80	86	81	73	93	80	50	89	80	75	85	80	75	65
Florida.....	87	90	85	85	91	80	78	114	125	85	115	105	95	70
Kentucky.....	90	105	85	80	91	65	100	123	108	120	115	120	120	70
Tennessee.....	103	122	99	94	102	84	80	97	70	85	95	95	90	55
Alabama.....	86	95	90	95	98	85	68	95	85	85	90	90	85	65
Mississippi.....	81	95	104	100	116	85	85	89	95	80	90	80	75	50
Arkansas.....	98	108	116	90	85	84	90	101	95	80	90	115	95	55
Louisiana.....	77	80	85	75	74	70	75	89	80	70	85	85	90	50
Oklahoma.....	97	105	106	89	84	70	70	108	100	80	95	115	100	70
Texas.....	82	88	85	78	76	70	72	103	95	75	103	105	95	60
Arizona.....	139	150	120	142	.....	.....	197	165	200	200	.....	.....	.....	.....
California.....	106	90	95	95	99	110	95	130	110	115	110	145	105	80
United States.....	92.9	98.3	98.3	93.5	100.6	82.8	80.9	99.3	93.8	82.7	90.9	93.9	90.0	57.4

Bureau of Agricultural Economics. Yield figures are estimates of the crop-reporting board, revised, 1919 to 1928. See introductory text. Prices are based upon returns from crop reporters.

TABLE 246.—Sweetpotatoes: Car-lot shipments, by State of origin, 1921-22 to 1930-31

State	Crop-movement season <sup>1</sup>									
	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31 <sup>2</sup>
	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>
New Jersey <sup>3</sup> .....	2,196	2,857	1,528	1,894	1,857	1,770	1,225	1,223	1,090	1,078
Indiana <sup>4</sup> .....	62	65	75	103	236	284	209	231	352	355
Delaware.....	1,722	2,632	1,549	1,750	1,742	1,885	1,517	1,470	1,454	771
Maryland.....	1,286	1,750	1,123	1,155	1,520	2,283	2,256	2,108	1,859	975
Virginia <sup>5</sup> .....	5,300	6,633	5,374	5,213	4,750	6,601	6,618	6,480	7,090	5,361
North Carolina <sup>6</sup> .....	1,022	680	563	816	1,510	1,683	1,711	760	729	883
South Carolina <sup>7</sup> .....	135	236	154	120	231	182	276	130	375	284
Georgia <sup>8</sup> .....	1,400	781	610	1,018	674	678	667	227	<sup>8</sup> 527	348
Florida.....	112	123	<sup>4</sup> 62	175	241	185	159	69	<sup>8</sup> 125	114
Kentucky <sup>9</sup> .....	85	55	30	81	90	302	185	121	268	222
Tennessee <sup>1</sup> .....	1,578	1,495	726	1,137	2,502	4,972	3,587	2,915	3,692	2,903
Alabama.....	591	537	332	649	663	515	574	393	570	320
Mississippi.....	181	116	61	36	156	79	211	126	271	219
Arkansas <sup>1</sup> .....	584	240	263	371	478	548	392	316	207	176
Louisiana <sup>2</sup> .....	893	1,033	403	558	2,340	1,285	1,147	981	1,463	1,224
Oklahoma.....	147	85	110	107	218	268	204	255	102	78
Texas.....	759	974	535	221	435	702	1,284	717	802	717
California.....	1,000	982	684	466	1,161	1,186	805	767	728	809
Other States <sup>1</sup> .....	332	288	240	247	419	467	306	258	338	427
Total <sup>1</sup> .....	19,385	21,562	14,532	16,067	20,859	25,755	23,423	19,545	22,042	17,324

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

<sup>1</sup>Crop movement season extends from July 1 of one year through June of the following year.

<sup>2</sup>Preliminary.

<sup>3</sup>Figures for certain States include shipments in July of succeeding crop year as follows: New Jersey, 1922-23, 3 cars; Indiana, 1926-27, 1 car; Virginia, 1928-29, 1 car; North Carolina, 1926-27, 3 cars; 1927-28, 10 cars; South Carolina, 1922-23, 1 car; Georgia, 1927-28, 2 cars; Kentucky, 1921-22, 1 car, 1926-27, 12 cars; 1928-29, 5 cars, 1930-31, 5 cars; Tennessee, 1921-22, 17 cars, 1924-25, 3 cars, 1925-26, 11 cars, 1926-27, 309 cars, 1927-28, 6 cars, 1928-29, 135 cars, 1929-30, 10 cars, 1930-31, 33 cars; Arkansas, 1921-22, 1 car, 1926-27, 1 car, 1930-31, 1 car; Louisiana, 1926-27, 1 car; New Mexico, 1921-22, 5 cars, 1928-29, 1 car, 1930-31, 2 cars; Tennessee, 1926-27, 19 cars in August.

<sup>4</sup>Includes 3 cars in June, 1923.

<sup>5</sup>Includes 10 cars in June, 1929.

TABLE 247.—Sweetpotatoes: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32

Crop year	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	Weighted average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1922-23.....	125.3	127.5	106.0	90.4	79.0	84.8	92.5	96.9	100.1	103.8	107.9	107.4	97.4
1923-24.....	112.1	151.3	133.6	114.8	101.0	108.8	112.5	123.7	129.0	140.4	130.2	138.9	121.7
1924-25.....	130.7	151.4	157.0	145.1	130.3	140.1	145.5	160.2	180.8	186.2	180.1	170.2	152.4
1925-26.....	188.7	196.3	177.4	169.4	144.4	141.5	149.3	162.4	171.4	180.4	192.2	198.8	165.9
1926-27.....	185.6	189.0	163.9	110.6	88.5	94.0	97.8	109.0	112.3	112.8	115.9	136.0	120.3
1927-28.....	136.4	146.7	121.9	98.1	86.5	81.9	93.4	98.0	109.6	115.1	121.4	124.7	106.5
1928-29.....	119.5	131.0	120.9	111.2	100.2	101.8	104.2	113.7	117.0	120.8	125.9	120.8	113.1
1929-30.....	135.9	136.2	127.9	112.5	97.7	98.9	103.1	109.6	114.6	118.3	120.4	128.6	113.7
1930-31.....	125.0	136.3	128.7	110.7	93.8	94.1	98.1	100.8	105.5	113.7	115.2	109.5	109.9
1931-32.....	101.1	107.8	81.4	66.1	58.2	58.5	.....	.....	.....	.....	.....	.....	.....

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by average monthly marketings. For previous data see 1930 or earlier Yearbooks.

## STATISTICS OF FRUITS AND VEGETABLES

787

TABLE 248.—*Spinach, commercial crop: Acreage, production, and price per bushel or ton, 1928-1931*

Utilization	Acreage				Production				Seasonal farm price			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>1,000 bush.<sup>1</sup></i>	<i>1,000 bush.<sup>1</sup></i>	<i>1,000 bush.<sup>1</sup></i>	<i>1,000 bush.<sup>1</sup></i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
For market.....	44,520	50,190	46,530	42,570	11,251	15,042	11,353	13,706	0.60	0.45	0.54	0.40
For manufacture.....	14,640	18,170	9,350	7,850	<i>Tons<sup>1</sup></i>	<i>Tons<sup>1</sup></i>	<i>Tons<sup>1</sup></i>	<i>Tons<sup>1</sup></i>	17.51	16.76	14.78	12.82
Total.....	59,160	68,360	55,880	50,420	185,710	247,320	151,930	171,760	43.00	33.80	43.90	34.16

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and canning establishments.

<sup>1</sup> Bushels containing approximately 20 pounds.<sup>2</sup> Short ton.TABLE 249.—*Strawberries, commercial crop: Acreage, production, and price per quart, by States, 1928-1931*

Group and State	Acreage				Production <sup>1</sup>				Seasonal farm price per crate			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>1,000 crates<sup>2</sup></i>	<i>1,000 crates<sup>2</sup></i>	<i>1,000 crates<sup>2</sup></i>	<i>1,000 crates<sup>2</sup></i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
Early:												
Alabama.....	5,380	6,320	6,930	3,950	495	515	295	424	3.50	2.40	3.10	2.90
Florida.....	4,500	6,800	9,000	9,100	226	544	603	655	3.40	5.30	6.70	5.75
Louisiana.....	23,200	24,360	24,600	24,600	1,392	1,437	1,181	1,870	5.50	5.00	5.50	4.55
Mississippi.....	1,000	1,080	1,240	1,400	63	73	51	105	4.30	3.35	2.65	2.75
Texas.....	1,600	3,160	2,030	1,550	102	123	73	136	4.80	2.90	4.30	6.25
Group total.....	35,680	42,220	43,800	40,500	2,281	2,695	2,206	3,190	5.36	4.42	5.40	4.59
Second early:												
Arkansas.....	21,600	22,000	15,300	9,000	929	1,122	474	531	2.40	2.60	3.60	2.55
California (S. Dist.).....	1,600	1,280	1,800	1,740	347	266	353	353	4.10	4.30	3.85	3.85
Georgia.....	400	400	300	250	19	18	14	20	2.90	2.90	2.60	2.65
North Carolina.....	7,500	7,000	5,400	5,300	818	679	437	636	2.90	3.10	2.90	2.65
South Carolina.....	300	500	360	320	30	34	24	27	2.90	3.35	2.90	2.65
Tennessee.....	18,080	16,810	12,600	10,000	1,012	1,076	617	590	1.90	2.40	3.10	2.50
Virginia.....	9,980	8,980	7,900	5,520	968	682	403	370	2.40	2.60	2.60	2.70
Group total.....	59,460	56,970	43,680	32,130	4,123	3,877	2,354	2,527	2.53	2.76	3.20	2.77
Intermediate:												
California, (other).....	2,150	2,280	2,250	2,450	372	326	484	502	3.60	3.85	3.60	3.35
Delaware.....	4,930	4,830	4,100	2,460	532	469	242	140	1.90	2.60	2.90	2.60
Illinois.....	4,700	4,790	4,070	4,270	258	283	205	205	2.90	2.15	3.60	3.00
Kansas.....	960	960	1,860	1,860	19	64	34	49	3.35	2.40	3.60	2.40
Kentucky.....	8,720	6,240	4,250	3,530	523	445	217	194	2.40	2.60	4.30	3.75
Maryland.....	13,900	11,750	9,400	6,080	925	905	499	365	1.70	2.60	2.90	2.75
Missouri.....	26,490	21,990	15,000	12,150	1,166	1,209	495	322	2.60	2.60	4.55	3.00
New Jersey.....	4,000	4,000	4,500	5,000	364	276	306	400	2.40	2.40	3.85	2.60
Oklahoma.....	1,550	1,900	1,400	1,120	61	76	38	28	1.90	2.40	3.85	3.50
Group total.....	67,300	58,740	45,830	37,920	4,210	4,051	2,497	2,234	2.37	2.65	3.66	2.96
Late:												
Indiana.....	1,680	1,510	1,540	1,350	136	119	57	112	2.40	3.10	3.80	2.50
Iowa.....	2,560	2,690	2,770	2,700	181	172	166	176	3.60	4.30	4.55	2.90
Michigan.....	6,090	6,940	7,220	7,250	371	361	455	616	3.60	4.30	4.55	2.45
New York.....	4,480	4,300	4,390	4,600	327	378	386	492	4.10	4.10	4.55	2.60
Ohio.....	3,700	4,370	4,280	3,100	248	310	154	208	4.80	3.10	4.55	2.85
Oregon.....	10,000	10,500	9,450	9,930	780	693	567	695	3.10	3.60	3.35	2.90
Pennsylvania.....	3,190	2,870	2,900	2,670	348	261	206	248	3.35	3.35	3.50	2.50
Utah.....	1,400	1,510	1,510	1,510	118	106	106	60	2.90	2.90	2.90	4.10
Washington.....	8,900	7,900	7,500	7,880	708	529	338	528	4.10	2.90	3.60	2.90
Wisconsin.....	2,840	2,840	2,840	2,900	128	258	145	200	5.00	3.60	4.80	2.45
Group total.....	44,840	45,430	44,400	43,890	3,290	3,187	2,580	3,335	3.64	3.55	4.03	2.72
Total all States.....	207,280	203,360	177,690	154,440	13,904	13,810	9,637	11,286	3.21	3.23	4.04	3.31

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

<sup>1</sup> Includes undetermined quantities used for canning, cold pack, etc.<sup>2</sup> 24-quart crates containing approximately 36 pounds.

TABLE 250.—*Strawberries: Car-lot shipments, by State of origin, 1927-1931*

Group and State	Calendar year					Group and State	Calendar year				
	1927	1928	1929	1930	1931 <sup>1</sup>		1927	1928	1929	1930	1931 <sup>1</sup>
Early:	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	Intermediate:	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>
Ala.-----	901	1,021	1,354	771	1,154	Ind.-----	44	126	105	33	64
Fla. <sup>2</sup> -----	618	545	1,633	1,721	1,862	Iowa-----	41	19	52	48	36
La.-----	1,659	2,850	2,859	2,389	4,720	Kans.-----	57	2	68	29	23
Miss-----	65	88	115	74	129	Ky.-----	976	1,078	851	404	395
Tex-----	126	148	253	92	65	Mid.-----	1,515	980	734	424	353
Other States-----			1	6	3	Mo.-----	1,986	2,637	2,062	807	692
Second early:						N. J.-----	134	186	176	106	00
Ark-----	2,049	2,046	2,488	688	578	Okla.-----	38	46	111	39	3
Calif., south- ern district-----	35	18	10	16	13	Late:					
N. C-----	2,202	2,151	1,483	756	1,228	Mass-----	67	35	47	44	21
S. C-----	33	71	30	9	44	Mich-----	114	61	79	57	53
Tenn-----	2,425	2,180	2,151	1,158	1,066	N. Y-----	189	70	55	31	58
Va-----	1,104	984	849	335	527	Oreg-----	110	99	103	35	37
Other States-----	20	23	17	9	14	Wash-----	93	106	61	12	23
Intermediate:						Wis-----	31	39	26	7	8
Calif., other-----	147	141	162	203	174	Other States-----	28	20	5	-----	9
Del-----	915	621	418	203	111	Total-----	17,893	18,715	18,626	10,669	13,642
Ill-----	176	324	273	163	119						

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

<sup>1</sup> Preliminary.

<sup>2</sup> Figures for Florida include shipments in December of preceding year as follows: 1927, 2 cars; 1929, 1 car; 1930, 107 cars; 1931, 16 cars.

TABLE 251.—*Tomatoes: United States commercial production, imports and exports, annual, 1923-1931*

Year	Commercial production		Imports, year beginning July				Exports, year beginning July	
	For market	For manu- facture	Fresh	Canned	Other- wise prepared	Paste	Canned	Catsup and sauces
	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
1923-----	972,300	2,530,800	150,838	30,946	1,341	14,164	9,152	13,560
1924-----	1,043,300	2,380,400	69,216	73,902	9,443	17,382	5,203	5,520
1925-----	1,095,800	3,618,400	82,448	84,897	(3)	18,179	5,794	6,006
1926-----	762,490	1,997,200	124,489	80,287	-----	15,642	7,504	7,556
1927-----	976,800	2,391,800	113,357	103,782	-----	12,064	6,725	8,584
1928-----	871,000	1,969,600	128,627	114,042	-----	9,539	4,009	13,066
1929-----	938,490	3,025,400	139,886	147,429	-----	16,547	4,872	10,419
1930-----	946,500	3,491,200	113,480	75,173	-----	11,605	2,916	5,210
1931-----	925,600	2,026,200	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Production figures based upon returns from crop reporters and canning establishments; imports and exports compiled from Monthly Summary of Foreign Commerce of the United States, June issues.

<sup>1</sup> January-June, 1924.

<sup>2</sup> From 1926 on included with "tomatoes, canned."

## STATISTICS OF FRUITS AND VEGETABLES

739

TABLE 252.—*Tomatoes, commercial crop: Acreage, production, and price per bushel or ton, 1928-1931*

Utilization, marketing season, and State	Acreage				Production				Seasonal farm price			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
For market:					1,000	1,000	1,000	1,000	Dols.	Dols.	Dols.	Dols.
Fall.....	1,200	5,300	3,980	6,870	bushels <sup>1</sup>	bushels <sup>1</sup>	bushels <sup>1</sup>	bushels <sup>1</sup>				
Early (sec. 1).....	11,640	14,700	11,800	8,300	74	344	284	439	2.36	2.67	2.39	2.23
Early (sec. 2).....	25,750	29,400	29,600	27,300	1,339	1,323	1,298	772	3.54	3.00	3.60	2.15
Second early.....	29,840	26,790	34,130	39,050	2,456	2,214	2,079	2,149	3.16	2.48	3.09	1.30
Intermediate.....	33,660	32,630	35,500	39,120	3,077	3,287	3,967	3,857	1.67	2.15	1.26	1.01
Late (sec. 1).....	22,820	25,920	30,840	31,670	4,335	4,952	4,443	4,790	1.15	1.54	1.15	.80
Late (sec. 2).....	14,160	8,350	10,500	8,500	3,352	3,987	4,052	4,012	1.15	1.11	1.16	1.01
Total.....	139,060	143,090	156,350	160,810	920	651	798	510	2.00	1.95	1.43	1.96
For manufacture:					Tons <sup>2</sup>	Tons <sup>2</sup>	Tons <sup>2</sup>	Tons <sup>2</sup>				
New York.....	12,500	13,600	15,500	11,300	78,800	85,700	77,500	91,500	15.20	15.70	15.40	13.30
New Jersey.....	33,000	33,000	43,000	30,000	118,800	214,500	258,000	132,000	18.50	21.00	19.40	15.60
Pennsylvania.....	3,600	3,420	5,400	4,300	13,000	13,700	16,200	15,500	14.50	15.00	15.40	13.10
Ohio.....	10,400	10,950	12,400	10,300	60,300	52,600	67,000	61,800	11.60	12.00	12.00	9.70
Indiana.....	49,870	59,840	79,000	64,000	149,600	251,300	395,000	192,000	12.90	13.20	13.30	10.00
Illinois.....	5,130	5,440	6,500	4,650	17,400	20,700	20,800	22,300	13.00	13.00	13.40	12.00
Michigan.....	1,660	1,990	2,600	2,000	9,600	9,000	14,000	14,000	11.00	12.00	12.00	9.80
Iowa.....	4,810	4,570	6,400	6,400	16,800	25,100	32,000	23,000	13.00	13.00	13.00	12.30
Missouri.....	18,700	20,940	28,900	20,000	33,700	60,700	60,700	42,000	12.60	13.30	13.70	11.00
Delaware.....	13,500	13,500	14,000	11,800	32,400	68,800	47,600	23,600	17.00	17.00	17.30	11.80
Maryland.....	32,000	44,000	43,900	38,000	89,600	224,400	151,600	76,000	15.70	16.10	17.40	12.00
Virginia.....	9,300	12,100	15,500	10,800	22,800	46,000	43,400	18,400	13.20	14.90	15.50	10.30
Kentucky.....	5,500	6,400	8,430	5,700	11,600	23,700	21,900	16,000	12.60	12.60	12.70	10.40
Tennessee.....	10,220	9,200	14,000	10,700	18,400	23,000	33,600	23,500	12.00	12.10	13.00	11.00
Arkansas.....	19,600	22,600	28,000	16,800	43,100	52,000	53,800	42,000	12.60	13.50	13.80	10.20
Colorado.....	1,600	2,030	2,230	2,500	11,800	17,700	19,000	17,500	11.00	11.00	10.90	10.50
Utah.....	5,650	6,180	8,200	6,200	65,500	56,900	55,800	51,500	11.00	11.00	11.50	10.20
California.....	24,700	41,680	52,250	23,160	182,800	241,700	329,200	127,400	14.60	15.20	15.10	15.00
Other States <sup>4</sup> .....	4,010	6,380	12,440	8,800	14,300	25,200	43,500	24,600	13.15	12.32	13.29	11.32
Total.....	265,750	317,820	403,650	287,410	984,800	1,612,700	1,745,600	1,014,600	14.20	15.26	15.05	12.10
Grand total for market and manufacture.....	404,810	460,910	560,000	448,220	1,420,284	1,981,924	2,218,828	1,477,412	23.90	27.17	24.24	20.39

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters and canning establishments.

<sup>1</sup> Bushels containing approximately 56 pounds.

<sup>2</sup> Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.

<sup>3</sup> Short ton.

<sup>4</sup> Other States include Connecticut, Kansas, Louisiana, Mississippi, Nebraska, New Mexico, Oklahoma, Oregon, South Carolina, Texas, Washington, West Virginia, and Wisconsin.

TABLE 253.—*Tomatoes: Car-lot shipments by State of origin, 1920-1931*

State	Calendar year											
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931 <sup>1</sup>
	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>
New York.....	1,945	1,073	1,902	1,261	954	1,024	656	951	1,112	838	511	800
New Jersey.....	2,798	2,121	1,930	1,845	2,150	1,907	2,006	1,320	678	694	812	571
Ohio.....	450	411	558	956	1,085	1,266	1,005	1,125	926	1,020	1,007	1,373
Indiana.....	1,265	552	1,332	1,185	1,479	1,569	1,514	1,132	799	1,631	2,217	965
Illinois.....	450	155	229	250	230	539	422	270	240	237	316	315
Iowa.....	19	14	10	10	4	118	96	167	120	53	197	—
Missouri.....	17	21	10	16	195	154	96	170	196	119	139	27
Maryland.....	194	110	242	271	66	313	259	586	613	775	554	369
Virginia.....	188	91	83	44	167	379	454	390	277	488	243	157
South Carolina.....	—	59	145	431	421	568	449	187	161	348	461	348
Georgia.....	—	—	23	18	176	85	169	82	73	61	61	12
Florida.....	4,192	5,785	10,245	9,760	9,140	7,188	4,851	9,737	8,491	8,038	6,495	5,435
Kentucky.....	468	341	153	121	546	498	300	203	42	244	40	—
Arkansas.....	11	23	47	9	38	104	261	240	389	300	318	218
Tennessee.....	805	370	920	501	985	1,393	2,874	2,016	2,750	2,817	2,496	2,035
Mississippi.....	1,393	1,945	2,441	2,144	3,776	3,149	3,492	4,849	3,230	4,099	3,451	2,783
Texas.....	1,393	2,025	1,893	1,084	1,694	2,398	2,890	3,393	4,435	5,338	7,546	8,764
Colorado.....	135	38	94	128	77	195	27	20	50	55	138	195
Utah.....	261	100	378	369	330	1,457	272	883	899	740	342	319
Washington.....	66	19	58	21	33	86	35	95	113	215	335	252
California.....	2,001	1,819	2,349	3,293	2,789	2,961	4,440	4,620	4,475	4,241	5,458	3,382
Other States.....	576	431	847	622	804	1,116	674	701	796	798	417	382
Total.....	18,304	17,415	26,717	23,967	26,830	28,251	30,068	32,604	30,305	32,202	33,578	27,762

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

<sup>1</sup> Preliminary.

<sup>2</sup> Figures for Florida include cars moved in preceding calendar year as follows: 1920, 14 cars in November, 34 cars in December; 1922, 10 cars in December; 1923, 26 cars in December; 1924, 2 cars in November, 55 cars in December; 1925, 14 cars in November, 31 cars in December; 1926, 7 cars in November, 13 cars in December; 1927, 1 car in December; 1928, 28 cars in November, 291 cars in December; 1929, 104 cars in November, 392 cars in December; 1930, 4 cars in November, 47 cars in December; 1931, 130 cars in November, 400 cars in December.

<sup>3</sup> Figures include cars in following calendar year as follows: California, 1923, 8 cars in January; 1924, 1 car in January; 1925, 1 car in January; 1926, 1 car in January; Texas, 1922, 5 cars in January, and 2 cars in February; 1925, 8 cars in January; 1926, 15 cars in January; 1927, 1 car in January; 1928, 1 car in January; 1929, 8 cars in January.

TABLE 254.—*Tomatoes, canned: Pack<sup>1</sup> in the United States, 1918-1931*

State	Season													
	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>
New York.....	396	437	515	214	340	260	325	389	302	300	261	320	467	497
New Jersey.....	667	60	517	116	337	412	186	418	204	254	98	257	350	144
Pennsylvania.....	441	884	680	186	644	258	180	338	118	107	65	122	151	100
Ohio.....	357	172	142	71	179	174	133	179	120	189	124	429	304	—
Indiana.....	968	876	778	530	1,312	717	1,050	1,955	900	1,131	912	1,134	2,029	1,192
Missouri.....	353	439	715	136	775	839	871	1,836	895	905	306	822	1,078	510
Delaware.....	879	189	553	176	590	1,218	808	1,272	228	827	325	851	755	340
Maryland.....	6,649	2,529	3,347	1,656	3,205	5,722	3,825	6,175	1,901	3,671	7,220	4,050	3,770	7,710
Virginia.....	1,547	953	1,162	217	891	903	1,116	1,138	572	1,059	408	918	818	508
Kentucky.....	—	—	—	—	—	59	136	275	223	253	111	167	181	161
Tennessee.....	—	—	—	—	—	176	888	382	280	308	160	297	518	314
Arkansas.....	—	—	—	—	—	270	768	1,168	558	678	613	769	1,050	761
Colorado.....	306	290	218	62	168	182	180	309	183	127	158	195	293	227
Utah.....	953	594	444	132	664	584	417	1,353	235	792	924	768	758	1,028
California.....	1,790	3,052	1,778	339	1,701	2,397	1,767	1,839	2,847	2,257	1,901	2,812	3,460	364
Other States.....	576	835	524	182	782	437	406	744	389	459	487	701	875	844
United States.....	15,882	10,810	11,368	4,017	11,588	14,672	12,519	19,770	9,456	13,137	8,539	14,145	16,998	9,573

Bureau of Agricultural Economics. Compiled from National Canners' Association, 1918-1926; Bureau of Census, 1927-1929; beginning 1930, Foodstuffs Division, Bureau of Foreign and Domestic Commerce.

<sup>1</sup> Stated in cases of 24 No. 3 cans.

<sup>2</sup> Previous to 1923, Pennsylvania, Kentucky, and Tennessee composed one group.

<sup>3</sup> Includes West Virginia.

<sup>4</sup> Previous to 1923, included in "Other States."

<sup>5</sup> Includes Washington.

TABLE 255.—*Walnuts: Production and value, California, 1922-1931*

Year	Production	Seasonal farm price	Farm value	Year	Production	Seasonal farm price	Farm value
	<i>Short tons</i>	<i>Dollars</i>	<i>1,000 dolls.</i>		<i>Short tons</i>	<i>Dollars</i>	<i>1,000 dolls.</i>
1922.....	27,000	360.00	9,720	1927.....	51,000	330.00	16,830
1923.....	25,000	400.00	10,000	1928.....	25,000	420.00	10,500
1924.....	22,500	480.00	10,350	1929.....	39,000	320.00	12,480
1925.....	36,000	440.00	15,840	1930.....	30,000	410.00	12,300
1926.....	15,000	480.00	7,200	1931 <sup>1</sup> .....	28,000	<sup>2</sup> 260.00	7,280

Bureau of Agricultural Economics.

<sup>1</sup> Preliminary.<sup>2</sup> Seasonal average price to Dec. 1.TABLE 256.—*Watermelons, commercial crop: Acreage, production, and price per 1,000 melons, <sup>1</sup> 1928-1931*

Marketing season	Acreage				Production				Seasonal farm price per 1,000 melons			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>1,000 melons</i>	<i>1,000 melons</i>	<i>1,000 melons</i>	<i>1,000 melons</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Early.....	44,840	48,000	43,200	40,800	15,320	17,904	<sup>2</sup> 16,471	16,759	247	230	100	156
Second early.....	129,880	132,280	147,200	145,100	36,755	37,031	<sup>2</sup> 51,170	39,494	148	151	88	75
Late.....	31,710	36,310	45,000	53,420	12,013	14,521	14,760	18,256	149	160	129	91
Total.....	206,410	216,590	235,400	239,320	64,088	70,056	<sup>2</sup> 82,401	<sup>2</sup> 75,509	172	173	116	101

Bureau of Agricultural Economics. Estimates based upon returns from crop reporters.

<sup>1</sup> Approximately 1,000 melons per acre.<sup>2</sup> Includes some quantities not harvested on account of market conditions. Price refers to harvested portion of crop.TABLE 257.—*Watermelons: Car-lot shipments, United States, 1921-1931*Crop-movement season <sup>1</sup>

season beginning April—	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>
1921.....	7	1,133	11,061	19,220	12,256	1,983	80	-----	45,749
1922.....	8	3,566	15,291	18,008	9,061	1,616	80	-----	47,625
1923.....	3	702	6,176	15,351	8,583	2,045	159	2	33,081
1924.....	<sup>2</sup> 3	05	6,602	20,024	10,470	2,458	120	4	45,745
1925.....	-----	605	11,767	17,814	11,524	2,390	82	2	44,184
1926.....	-----	443	11,424	29,873	11,497	1,861	28	-----	55,126
1927.....	4	1,713	15,255	20,898	6,262	1,261	67	-----	45,490
1928.....	-----	508	10,410	24,937	11,408	1,183	50	1	48,497
1929.....	36	3,498	22,047	18,287	7,582	1,007	57	-----	52,514
1930.....	-----	386	17,830	29,028	10,306	1,350	102	-----	59,011
1931 <sup>2</sup> .....	-----	121	16,161	23,610	10,362	1,610	56	-----	51,020

Bureau of Agricultural Economics. Compiled from daily and monthly reports received by the bureau from officials and local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

<sup>1</sup> Crop-movement season extends from Apr. 1 through November of a given year.<sup>2</sup> Preliminary.<sup>3</sup> Reported as shipped in January.TABLE 258.—*Watermelons, Tom Watson: Price per car to jobbers, Chicago and New York, 1924-1931 <sup>1</sup>*

Market and season <sup>2</sup>	June	July	August	Market and season <sup>2</sup>	June	July	August
Chicago:	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	New York:	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
1924.....	576	249	291	1924.....	<sup>3</sup> 474	<sup>3</sup> 270	<sup>3</sup> 273
1925.....	576	362	<sup>4</sup> 211	1925.....	<sup>3</sup> 512	<sup>3</sup> 311	202
1926.....	628	281	<sup>4</sup> 202	1926.....	460	248	180
1927.....	471	289	-----	1927.....	435	289	237
1928.....	445	301	252	1928.....	378	282	216
1929.....	365	339	-----	1929.....	368	278	<sup>4</sup> 324
1930.....	511	271	269	1930.....	469	214	211
1931.....	426	273	-----	1931.....	<sup>5</sup> 427	-----	-----

Bureau of Agricultural Economics. Compiled from daily market reports from bureau representatives in the various markets. Average prices as shown are based on stock of good merchantable quality and condition; they are simply averages of daily range of selling prices.

<sup>1</sup> Quotations are for southeastern, 22 to 26 pound average.<sup>2</sup> Commodity reports were issued for season as follows: 1924, June 6-Aug. 30; 1925, May 28-Sept. 5; 1926, May 28-Sept. 1; 1927, May 16-Aug. 26; 1928, May 21-Aug. 24; 1929, May 9-Aug. 31; 1930, May 28-Aug. 16; 1931, June 8-Sept. 1.<sup>3</sup> Auction sales.<sup>4</sup> Thurmond Gray.<sup>5</sup> Less than 10 quotations.

TABLE 259.—*Fruits and vegetables: Unloads of 18 commodities at 12 markets, in car lots, 1930 and 1931 and total 1924-1931*

Commodity and calendar year	New York	Chicago	Philadelphia	Boston	Detroit	Pittsburgh	St. Louis	Los Angeles	Cleveland	Baltimore	Cincinnati	San Francisco
Apples:	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars	Cars
1930.....	10,686	5,891	2,419	1,282	2,038	2,800	1,087	4,011	1,384	569	1,375	875
1931.....	11,470	6,193	2,349	1,769	2,242	2,060	554	3,650	1,101	351	952	682
Cabbage:												
1930.....	6,024	1,866	2,450	1,221	814	1,443	1,290	14	660	1,573	769	3
1931.....	5,757	1,963	2,928	1,398	899	1,217	1,409	181	584	1,468	605	3
Cantaloupes: <sup>1</sup>												
1930.....	9,309	3,214	2,415	2,010	1,140	1,411	872	510	1,066	600	707	589
1931.....	9,184	2,942	2,332	1,972	1,141	1,547	802	380	1,078	627	647	500
Celery:												
1930.....	4,654	1,892	1,802	947	830	991	674	79	442	769	394	432
1931.....	4,177	1,560	1,639	819	824	882	565	86	403	714	385	344
Grapefruit:												
1930.....	5,150	1,868	1,310	1,088	643	597	509	120	572	546	373	352
1931.....	7,847	2,143	1,624	1,535	1,087	728	638	159	796	602	512	393
Grapes:												
1930.....	16,694	4,834	3,740	4,428	1,445	2,867	795	90	1,053	651	584	2,823
1931.....	11,637	3,213	2,647	3,244	899	1,722	541	56	519	461	417	2,080
Lemons:												
1930.....	4,296	1,119	840	579	454	414	467	1	335	451	401	367
1931.....	3,091	1,241	838	646	515	504	495	—	405	510	431	343
Lettuce:												
1930.....	9,849	4,853	3,357	2,066	1,702	1,481	1,627	1,212	1,118	1,015	712	318
1931.....	8,771	4,341	3,162	1,942	1,662	1,259	1,344	835	1,127	849	652	294
Onions:												
1930.....	7,285	2,283	2,408	2,145	1,453	1,141	924	606	878	702	549	671
1931.....	6,784	1,897	2,161	1,877	850	934	853	802	631	609	450	901
Oranges:												
1930.....	13,220	4,932	4,130	3,959	2,032	1,945	1,219	203	1,665	1,372	971	1,064
1931.....	19,040	6,323	5,546	5,651	2,851	2,336	1,701	99	2,191	1,802	1,454	1,167
Peaches:												
1930.....	3,872	1,593	992	807	747	735	509	637	538	383	678	580
1931.....	5,530	2,901	1,230	1,474	1,632	950	455	698	878	312	837	444
Pears:												
1930.....	6,119	2,138	1,520	830	607	876	299	886	456	427	250	455
1931.....	5,557	1,264	928	707	371	433	149	491	299	242	127	456
Plums and prunes, fresh:												
1930.....	1,772	626	376	284	229	187	185	54	186	115	114	49
1931.....	1,674	435	303	226	145	100	54	42	115	60	79	19
Potatoes:												
1930.....	23,117	16,296	8,871	8,589	8,047	4,610	4,851	6,509	3,921	3,150	3,439	3,613
1931.....	20,368	16,408	7,537	7,898	6,573	3,999	4,647	6,429	3,900	3,067	3,178	3,651
Strawberries:												
1930.....	1,365	1,151	330	711	511	303	146	75	310	142	304	23
1931.....	1,869	1,371	439	853	677	389	289	89	411	182	484	9
Sweetpotatoes:												
1930.....	1,570	1,636	320	793	702	962	270	305	562	851	558	163
1931.....	1,121	1,639	286	879	779	904	164	205	680	581	535	36
Tomatoes:												
1930.....	8,153	2,965	2,225	1,927	1,354	1,575	583	566	349	1,055	504	648
1931.....	6,674	2,585	1,860	1,787	1,146	1,332	689	417	265	915	450	330
Watermelons:												
1930.....	3,652	2,823	2,035	724	1,539	1,112	1,568	2,141	1,070	985	1,438	382
1931.....	3,632	2,806	1,643	692	1,354	852	1,728	1,966	1,076	1,397	1,502	406
Total: <sup>2</sup>												
1924.....	122,744	56,079	35,874	22,937	13,589	21,124	14,394	14,976	16,092	12,843	12,278	11,516
1925.....	125,609	57,782	35,229	30,119	17,080	20,416	15,181	15,104	15,541	11,977	11,785	13,095
1926.....	128,667	59,349	35,383	30,513	20,558	21,078	16,278	16,244	16,380	12,072	11,976	14,121
1927.....	139,463	64,617	35,970	35,588	22,679	21,464	16,523	16,012	16,828	12,534	12,213	14,645
1928.....	140,142	65,405	34,905	33,773	23,672	21,688	15,599	17,135	16,430	12,897	12,424	14,202
1929.....	141,634	64,141	33,180	37,582	27,918	26,010	17,452	17,817	17,913	13,369	13,019	12,965
1930.....	137,686	61,982	41,590	34,360	26,267	25,450	17,884	18,039	16,651	15,360	14,126	13,887
1931.....	133,663	61,325	39,442	35,369	25,547	22,148	17,077	16,616	16,442	14,739	13,757	12,058

Bureau of Agricultural Economics. Compiled from daily reports made by common carriers to bureau representatives in the various markets. Unloads as shown in car lots include those by boat and less than car lots reduced to car-lot basis. This table not comparable with table published in former Yearbooks.

<sup>1</sup> Includes honeydews and other miscellaneous melons.

<sup>2</sup> Totals include: 1924-1926, 16 commodities, beginning 1927, 18 commodities.

TABLE 260.—*Fruits and vegetables: Unloads of truck receipts of specified commodities in 7 markets, in car-lot equivalents, 1930 and 1931*

Commodity and year	Boston	Denver	Los Angeles	New York	Philadelphia	Salt Lake City	San Francisco
Apples:	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>
1930.....	1,616	30	199	2,703	1,397	127	59
1931.....	1,568	17	266	2,300	1,853	124	373
Beans, snap:							
1930.....	672	64	1,275	2,004	913	44	15
1931.....		45		1,675	1,636	50	253
Cabbage:							
1930.....	530	98	1,193	1,927	503	76	27
1931.....	509	97	1,099	1,771	691	76	322
Cantaloupes: <sup>1</sup>							
1930.....	0	116	2,163	403	794	146	142
1931.....	2	178	2,331	829	1,173	204	496
Carrots:							
1930.....	697	163	2,126	1,092	310	127	30
1931.....		59		965	474	136	352
Celery:							
1930.....	374	187	2,704	2,553	195	100	143
1931.....	388	160	2,469	742	265	94	399
Corn, green:							
1930.....	687	187	1,014	2,870	1,554	80	184
1931.....		190		2,901	2,020	74	341
Cucumbers:							
1930.....	364	64	424	555	243	40	4
1931.....		53		775	404	61	72
Grapes:							
1930.....	18	0	2,079	207	125	15	83
1931.....	35	0	1,455	205	222	26	325
Lettuce: <sup>2</sup>							
1930.....	1,057	199	3,000	2,341	140	117	188
1931.....	1,054	206	3,415	1,214	434	110	1,301
Onions:							
1930.....	69	125	669	1,748	135	80	4
1931.....	83	62	565	1,519	212	85	49
Peaches:							
1930.....	39	0	1,145	660	608	74	0
1931.....		0	1,446	1,833	1,824	126	354
Pears:							
1930.....	51	0	420	334	41	43	9
1931.....	50	0	504	222	45	18	133
Peppers:							
1930.....	237	66	415	1,187	484	31	20
1931.....		52		1,152	541	32	130
Plums and prunes:							
1930.....	0	6	284	4	0	22	0
1931.....	0	0	267	5	2	24	71
Potatoes:							
1930.....	136	392	1,594	3,286	1,738	515	1
1931.....	99	499	1,870	4,879	3,571	574	269
Spinach:							
1930.....	993	77	1,146	2,042	436	67	59
1931.....	990	62	1,143	1,726	1,005	54	434
Strawberries:							
1930.....	173	43	823	676	0	62	301
1931.....	160	46	628	609	1,083	68	286
Sweet potatoes:							
1930.....	0	0	450	1,148	880	0	33
1931.....	0	0	625	1,647	1,890	1	149
Tomatoes:							
1930.....	581	153	2,710	2,266	1,702	153	252
1931.....	376	109	2,755	1,917	1,474	225	667
Watermelons:							
1930.....	0	35	616	20	118	45	0
1931.....	0	17	703	20	328	66	23

Bureau of Agricultural Economics. Compiled from reports made by bureau representatives in the various markets. Data for some markets are incomplete. They are reported as follows: *Denver*.—Receipts for 1930 are estimated about 90 per cent of the total truck receipts of those commodities. *Philadelphia*.—For 1930, truck reports are available for July-December only. They are estimated to represent about 90 per cent of the truck receipts during those months. *San Francisco*.—For 1930, reports on cantaloupes, corn, strawberries and tomatoes were secured throughout the year; other commodities mostly for November and December only.

<sup>1</sup> Includes Casabas, Honeydews, Honey Balls, etc.

<sup>2</sup> Includes Romaine.

# STATISTICS OF MISCELLANEOUS CROPS

TABLE 261.—*Beans, dry edible:*<sup>1</sup> *Acreage, production, value, exports, etc., United States, 1899, 1909, 1914-1931*

Year	Acreage	Average yield per acre	Production	Price per bushel received by producers Dec 1 <sup>2</sup>	Farm value	Wholesale price at Chicago <sup>3</sup>	Imports, year beginning July 1 <sup>4</sup>	Domestic exports, year beginning July 1 <sup>4</sup>
	1,000 acres	Bushels of 60 pounds	1,000 bushels	Dollars	1,000 dollars	Dollars	1,000 bushels	1,000 bushels
1899.....	454	11.9	5,064	—	—	1.23	—	—
1900.....	803	14.0	11,251	—	—	2.27	1,015	—
1914.....	875	13.2	11,585	2.26	26,213	1.33	900	—
1915.....	928	11.1	10,321	2.59	28,771	1.91	603	—
1916.....	1,107	9.7	10,715	5.10	54,684	2.54	3,748	—
1917.....	1,821	8.8	16,045	6.50	104,350	5.45	4,140	1,517
1918.....	1,744	10.0	17,397	5.28	91,863	6.80	4,016	4,489
1919.....	1,163	12.1	14,079	—	—	—	—	—
1919.....	1,065	12.6	13,399	4.26	57,049	4.75	3,800	1,933
1920.....	852	10.8	9,225	2.96	27,282	4.00	824	1,216
1921.....	762	11.7	9,185	2.67	24,515	2.77	620	1,100
1922.....	1,096	11.9	12,577	3.74	48,133	4.48	2,028	692
1923.....	1,344	12.1	16,308	3.67	59,782	4.22	886	675
1924.....	1,617	—	—	—	—	—	—	—
1924.....	1,570	9.6	15,104	3.74	58,744	3.28	1,421	519
1925.....	1,606	12.4	19,923	3.25	65,378	3.70	1,271	576
1926.....	1,677	10.6	17,707	2.93	51,876	2.97	1,051	539
1927.....	1,571	10.3	16,181	2.88	46,012	7 3.31	2,405	427
1928.....	1,641	10.8	17,647	4.18	73,782	5.40	1,505	316
1929.....	1,836	11.2	20,511	5 6.27	76,705	5.86	2,531	206
1930.....	2,091	11.0	23,063	8 8.90	53,719	3.98	1,840	271
1931 <sup>5</sup> .....	1,800	11.5	21,298	2 2.46	31,199	2.72	—	—

Bureau of Agricultural Economics. <sup>1</sup> Italian figures are census returns; census figures include all States; other figures, estimates of crop-reporting board, principal producing States only.

<sup>2</sup> Table includes, besides the ordinary edible beans and limas, the blackeye of California which is identical with the blackeyed pea of the South. Soybeans not included.

<sup>3</sup> Farm prices are as of Nov. 15, 1914-1924.

<sup>4</sup> Prices 1899 and 1909 from Chicago Board of Trade annual reports, quotations for navy, good to choice; 1914-1929 from Daily Trade Bulletin, pea beans (quoted per 100 pounds; converted to bushels of 60 pounds). <sup>5</sup> Imports and exports compiled from Commerce and Navigation of the United States, 1910-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1926; January and June issues, 1927-1931; and official records of the Bureau of Foreign and Domestic Commerce.

<sup>6</sup> Not separately reported prior to 1918.

<sup>7</sup> Dollars per bag of 100 pounds.

<sup>8</sup> Not separately reported.

<sup>9</sup> Preliminary.

<sup>1</sup> 11 months.

TABLE 262.—*Beans, dry edible:*<sup>1</sup> *Acreage, production, and December 1 price, by States, 1928-1931*

State	Acreage				Average yield per acre				Production				Price per bag of 100 pounds received by producers Dec. 1			
	1928	1929	1930	1931 <sup>2</sup>	1928	1929	1930	1931	1928	1929	1930	1931 <sup>2</sup>	1928 <sup>3</sup>	1929	1930	1931
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	Bus.	Bus.	Bus.	Bus.	1,000 bus.	1,000 bus.	1,000 bus.	1,000 bus.	Dolls.	Dolls.	Dolls.	Dolls.
Me.....	6	8	9	10	15.0	12.0	12.3	12.5	90	96	112	125	5.10	8.50	7.30	4.70
Vt.....	5	3	3	4	14.0	9.5	10.0	10.0	70	28	30	40	4.75	7.10	5.50	4.50
N. Y.....	80	103	124	120	14.5	12.0	9.3	18.0	1,160	1,236	1,153	2,160	4.70	7.45	5.55	3.00
Mich.....	538	575	690	614	11.0	9.1	6.1	9.0	5,918	5,232	4,209	5,528	4.46	6.20	4.30	2.13
Wis.....	6	8	9	7	9.0	7.0	6.7	4.0	54	56	60	26	3.90	6.00	5.65	3.20
Minn.....	5	5	6	7	9.0	6.0	6.0	6.5	45	80	36	46	4.00	7.20	5.95	3.35
Nebr.....	9	9	10	14	9.7	7.5	9.5	6.5	87	68	95	91	3.50	6.20	5.26	2.80
Kans.....	6	22	13	9	6.0	5.0	12.0	5.0	36	110	156	80	3.75	6.15	5.20	2.90
Mont.....	40	47	49	37	14.5	16.0	18.0	18.0	580	752	882	592	3.85	6.00	4.10	1.00
Idaho.....	36	134	168	178	19.0	20.0	19.0	19.5	1,634	2,680	3,192	3,471	3.00	4.55	3.00	1.45
Wyo.....	24	31	37	38	15.0	16.0	20.0	17.0	360	496	740	612	3.40	5.15	4.00	1.75
Colo.....	369	372	432	320	4.5	6.0	10.0	4.3	1,390	2,232	4,320	1,376	3.40	4.50	2.25	1.80
N. Mex.....	214	167	169	161	4.0	9.9	4.5	7.5	856	1,658	760	1,208	3.80	3.15	4.85	2.10
Ariz.....	6	6	8	8	7.0	8.0	8.5	7.0	42	48	65	56	3.70	5.25	3.50	2.85
Oreg.....	7	7	1	1	—	4.1	12.0	12.0	—	29	12	12	—	8.30	5.75	4.00
Calif.....	307	339	363	334	17.3	17.0	19.9	17.7	5,325	5,768	7,238	5,905	4.40	8.25	4.80	3.50
U. S.....	1,641	1,836	2,091	1,800	10.8	11.2	11.0	11.5	17,647	20,514	23,063	21,298	4.18	6.27	3.90	2.46

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Table includes, besides the ordinary edible beans and limas, the blackeye of California which is identical with the blackeyed pea of the South. Soybeans not included.

<sup>2</sup> Preliminary.

<sup>3</sup> Price per bushel of 60 pounds.

TABLE 263.—*Beans, dry edible:*<sup>1</sup> *Production by varieties, 100-pound bags, United States, 1927-1931*

Year	Small white and pea beans	Large white	Great Northern	Yellow eye	White kidney	Red kidney	Cranberry	Red Mexican	Pinto	Pinks	Limas <sup>2</sup>	Other	Total <sup>3</sup>
	1,000 bags	1,000 bags	1,000 bags	1,000 bags	1,000 bags	1,000 bags	1,000 bags	1,000 bags	1,000 bags	1,000 bags	1,000 bags	1,000 bags	1,000 bags
1927 <sup>4</sup> ..	3,040	219	1,349	117	54	493	113	191	1,530	586	1,361	345	9,703
1928 <sup>4</sup> ..	3,730	236	1,229	114	33	680	106	297	1,372	589	1,355	419	10,588
1929 <sup>4</sup> ..	3,721	210	1,744	104	42	418	107	305	2,305	644	1,473	562	12,240
1930 <sup>4</sup> ..	3,309	224	2,066	77	88	334	123	541	3,024	606	1,798	672	13,759
1931 <sup>5</sup> ..	4,148	338	2,006	140	117	586	127	518	1,499	567	1,727	470	12,705

Bureau of Agricultural Economics. Based upon reports by growers on proportion of total production made up of each variety, supplemented by investigations of field statisticians.

<sup>1</sup> Table includes, besides the ordinary edible beans and Limas, the blackeye of California, which is identical with the blackeyed "pea" of the South. Soybeans not included.

<sup>2</sup> Figures for all Limas include the following: Standard Limas, 1927, 1,036,000 bags; 1928, 954,000 bags; 1929, 987,000 bags; 1930, 1,102,000 bags; 1931, 1,064,000 bags; Baby Limas, 1927, 325,000 bags; 1928, 401,000 bags; 1929, 486,000 bags; 1930, 696,000 bags; 1931, 663,000 bags.

<sup>3</sup> Totals include blackeyes as follows: 1927, 310,000 bags; 1928, 428,000 bags; 1929, 515,000 bags; 1930, 887,000 bags; 1931, 462,000 bags.

<sup>4</sup> Computed from bushels of 60 pounds.

<sup>5</sup> Preliminary.

TABLE 264.—*Beans, dry edible: Production<sup>1</sup> in specified countries, bags of 100 pounds, 1925-26 to 1931-32*

Country	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32 <sup>2</sup>
	1,000 bags	1,000 bags	1,000 bags	1,000 bags	1,000 bags	1,000 bags	1,000 bags
Canada.....	900	696	622	702	895	863	761
United States.....	11,902	10,512	9,640	10,524	12,240	13,759	12,705
Mexico.....	4,326	4,711	4,307	3,883	2,094	1,774	-----
England and Wales.....	3,307	3,540	3,655	2,923	2,462	3,118	2,691
Scotland.....	67	65	67	67	60	76	-----
Netherlands.....	403	361	233	230	336	-----	-----
France.....	3,436	2,100	2,707	1,635	2,249	2,581	2,598
Italy.....	3,148	3,534	2,441	1,785	3,468	3,490	2,271
Spain.....	3,728	2,760	3,877	2,578	3,438	3,631	-----
Germany.....	-----	-----	400	253	272	255	240
Czechoslovakia.....	312	311	295	215	247	214	-----
Austria.....	231	172	215	208	272	276	-----
Hungary.....	1,086	1,358	1,054	605	1,023	1,017	<sup>3</sup> 710
Yugoslavia.....	2,016	2,612	1,573	697	2,068	3,362	<sup>4</sup> 1,500
Rumania.....	5,402	5,542	3,784	2,652	5,711	4,476	<sup>5</sup> 6,866
Bulgaria.....	1,303	992	638	386	1,121	1,724	<sup>6</sup> 2,200
Greece.....	174	205	106	104	109	128	-----
Japan.....	1,766	1,339	1,637	1,499	<sup>4</sup> 2,150	<sup>4</sup> 2,920	<sup>4</sup> 1,494
China.....	122	137	99	83	80	103	-----
Brazil.....	11,219	11,729	13,455	15,321	-----	-----	-----
Chile.....	970	1,126	1,725	1,660	1,691	1,489	-----
Madagascar <sup>7</sup> .....	463	305	281	264	380	<sup>8</sup> 233	<sup>8</sup> 308
Total countries reporting all periods.....	34,789	32,506	28,032	23,572	33,773	37,539	34,094
Total all countries.....	-----	-----	52,811	48,174	-----	-----	-----

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture except as otherwise stated. Figures are for the harvesting seasons 1925 to 1931 in the Northern Hemisphere and 1925-26 to 1931-32 in the Southern Hemisphere.

<sup>1</sup> Excluding soy, mung, adzuki, broad, and horse beans and similar classes not commonly used as edible beans in the United States.

<sup>2</sup> Preliminary.

<sup>3</sup> Unofficial estimate.

<sup>4</sup> Production in Hokkaido Province, where most of the dry edible bean varieties are grown.

<sup>5</sup> Lima beans.

TABLE 265.—Beans, dry, edible: Car-lot shipments, by State of origin, 1920-21 to 1930-31

State	Crop-movement season <sup>1</sup>										
	1920-21	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31 <sup>2</sup>
	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>	<i>Cars</i>
New York.....	935	1,555	1,650	1,969	1,900	1,158	916	614	889	1,056	961
Michigan.....	5,095	4,784	5,477	8,333	7,848	10,506	8,699	4,989	6,383	5,616	5,046
Montana.....	29	12	44	104	124	288	280	386	566	733	647
Idaho.....	139	141	351	749	1,336	1,898	1,437	2,074	1,973	2,516	2,671
Wyoming.....		1		9	31	82	130	253	347	577	785
Colorado.....	333	486	427	1,732	1,816	2,927	1,866	1,711	1,732	2,347	4,312
New Mexico.....	740	839	75	146	388	170	412	608	555	1,750	624
California.....	3,148	3,403	3,774	2,951	1,847	2,558	3,433	3,261	2,961	3,588	2,850
Other States.....	80	83	46	100	134	138	114	55	122	239	357
Total.....	10,499	11,304	11,844	16,093	14,924	19,725	17,287	13,940	15,528	18,422	18,253

Bureau of Agricultural Economics. Compiled from monthly reports received by the bureau from local agents of common carriers throughout the country. Shipments as shown in car lots include those by boat reduced to car-lot basis.

<sup>1</sup> Crop-movement season extends from September of one year through August of the following year.

<sup>2</sup> Preliminary.

TABLE 266.—Beans, dry, edible: Wholesale price per 100 pounds. 1922-23 to 1931-32

PEA (NEW YORK AND MICHIGAN HAND PICKED), BOSTON <sup>1</sup>

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Average
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1922-23.....	7.06	6.97	7.68	7.81	7.62	7.71	7.66	7.60	7.27	7.35	7.18	6.89	7.40
1923-24.....	7.40	7.75	7.79	7.12	7.06	7.40	7.30	7.28	7.12	7.12	7.16	7.68	7.35
1924-25.....	8.04	8.18	8.10	8.00	6.94	7.20	6.91	6.60	6.31	6.34	6.17	5.89	7.06
1925-26.....	5.50	5.49	5.86	5.90	5.67	5.49	5.32	5.06	5.01	5.48	5.65	5.48	5.49
1926-27.....	5.28	5.98	6.32	6.11	5.86	5.66	5.38	5.28	5.46	6.29	6.48	6.62	5.89
1927-28.....	6.34	6.18	6.12	6.16	6.69	7.88	8.71	9.81	10.08	10.18	10.30	10.22	8.22
1928-29.....	9.94	9.75	9.55	9.50	9.95	10.97	11.13	10.41	10.45	10.38	9.97	10.32	10.19
1929-30.....	10.56	10.12	8.66	8.09	8.12	8.00	7.62	7.13	7.22	7.31	7.02	7.81	8.14
1930-31.....	8.25	7.12	6.38	6.32	6.19	5.75	5.68	5.55	5.25	5.06	4.98	4.91	5.95
1931-32.....	4.62	4.25	4.19	3.62									

SMALL WHITE, SAN FRANCISCO <sup>2</sup>

1922-23.....	5.40	5.59	6.11	6.48	7.48	7.23	7.27	7.22	6.76	6.81	6.42	6.05	6.57
1923-24.....	6.75	6.05	6.09	5.92	5.92	6.13	6.03	6.02	6.94	6.29	7.04	7.29	6.33
1924-25.....	7.86	8.00	7.89	7.18	7.22	7.71	7.54	7.49	7.98	7.31	7.42	7.42	7.54
1925-26.....	7.32	6.20	5.71	5.98	6.26	6.25	5.97	5.87	5.62	5.67	5.83	5.95	6.04
1926-27.....	5.66	5.89	5.94	5.81	5.83	5.85	5.86	6.34	7.17	8.26	8.57	8.58	6.65
1927-28.....	7.75	5.60	5.88	5.80	6.21	6.66	8.42	9.20	9.38	9.03	8.75	8.36	7.58
1928-29.....	7.15	8.11	8.40	8.52	9.23	9.99	9.90	9.59	9.45	9.45	10.59		
1929-30.....		8.67	8.55	8.06	7.38	7.83	8.12	7.87	7.83	7.64	7.43	6.99	
1930-31.....	7.02	6.09	5.20	4.86	4.56	4.51	4.28	4.24	4.27	4.02	3.67	3.73	4.70
1931-32.....	3.56	2.98	3.38	3.12									

LIMA, CALIFORNIA, NEW YORK <sup>1</sup>

1922-23.....	8.91	8.49	8.65	8.91	9.39	9.79	9.50	9.41	8.59	8.80	8.25	8.55	8.94
1923-24.....	9.40	9.84	10.41	10.09	10.81	11.30	12.40	12.68	12.48	12.59	12.62	13.04	11.47
1924-25.....	13.62	14.42	14.12	13.89	14.41	15.00	14.79	14.85	14.94	15.27	15.79	16.27	14.78
1925-26.....	15.92	14.11	13.24	11.88	11.83	12.06	11.20	10.13	9.15	8.88	8.76	8.55	11.31
1926-27.....	8.94	8.44	7.68	7.01	7.14	6.94	6.97	6.97	6.88	6.74	6.68	6.67	7.25
1927-28.....	6.96	6.97	6.85	6.83	7.00	7.87	8.33	9.06	9.69	9.75	9.90	10.17	8.28
1928-29.....	9.90	9.76	10.66	10.01	12.61	13.42	13.50	13.50	14.40	15.25	15.90	16.17	13.08
1929-30.....	16.76	14.39	13.27	12.95	12.28	12.07	12.71	12.71	12.47	12.45	12.01	11.95	13.02
1930-31.....	12.05	9.90	8.74	7.37	7.58	7.94	7.56	7.80	7.40	6.55	5.98	6.29	7.90
1931-32.....	6.08	5.78	5.88	5.50									

Bureau of Agricultural Economics. Compiled from the Boston Produce Market Report, weekly; San Francisco Commercial News, daily; and New York Producers Price Current, daily. See 1930 Yearbook, pp. 794-795 for data for earlier years.

<sup>1</sup> Prices represent prevailing values of the commodity and grade specified, as indicated by sales from receivers to wholesale distributors.

<sup>2</sup> Quotations for shipment f. o. b. rail California.

## STATISTICS OF MISCELLANEOUS CROPS

747

TABLE 267.—*Soybeans: Acreage, production, and value, by States, 1930 and 1931*

State	Beans gathered						Total, except hay						Farm price Dec. 1 of beans gathered		Value of total production except hay <sup>4</sup>	
	Acreage <sup>1</sup>		Yield per acre		Total yield		Total acreage <sup>2</sup>		Yield per acre <sup>3</sup>		Total pro- duction <sup>3</sup>					
	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931
	1,000 acres	1,000 acres	Bus.	Bus.	1,000 bus.	1,000 bus.	1,000 acres	1,000 acres	Bus.	Bus.	1,000 bus.	1,000 bus.	Dolla. p. bu.	Dolla. p. bu.	1,000 dolla.	1,000 dolla.
Ohio.....	21	28	14.0	20.0	294	560	21	28	14.0	20.0	294	560	1.60	0.35	470	196
Ind.....	129	172	14.0	17.8	1,806	3,062	129	172	14.0	17.8	1,806	3,062	1.20	.35	2,167	1,072
Ill.....	336	346	17.0	17.5	5,712	6,055	336	346	17.0	17.5	5,712	6,055	1.20	.35	6,854	2,119
Mich.....	2	2	10.0	12.0	20	24	2	2	10.0	12.0	20	24	2.00	.25	40	6
Wis.....	2	2	11.5	10.0	23	20	2	2	11.5	10.0	23	20	2.50	.90	58	18
Iowa.....	52	34	16.5	17.0	858	578	52	34	16.5	17.0	858	578	1.35	.60	1,158	347
Mo.....	78	90	9.5	12.0	741	1,080	78	90	9.5	12.0	741	1,080	1.65	.60	1,223	648
Kans.....	8	12	7.5	9.0	60	108	8	12	7.5	9.0	60	108	1.60	1.00	96	108
Del.....	26	26	6.0	14.0	156	364	26	26	6.0	14.0	156	364	2.45	.60	382	218
Md.....	5	7	6.5	13.5	32	94	5	7	6.5	13.5	32	94	2.25	.90	72	85
Va.....	18	20	7.5	14.0	135	280	20	28	7.5	14.0	195	392	2.40	.80	468	314
W. Va.....	1	1	7.0	12.0	7	12	3	3	7.0	12.0	21	36	2.90	2.15	61	77
N. C.....	97	107	13.0	14.0	1,261	1,498	237	253	13.0	14.0	3,081	3,542	1.55	.70	4,776	2,479
S. C.....	8	10	10.5	9.5	84	95	28	34	10.5	9.5	294	323	2.05	1.20	603	388
Ga.....	11	15	10.0	9.5	110	142	14	18	10.0	9.5	140	171	3.00	1.80	420	308
Ky.....	6	7	10.0	13.5	60	94	26	28	10.0	13.5	260	378	2.35	.85	611	321
Tenn.....	18	22	8.0	7.5	144	165	18	22	8.0	7.5	144	165	2.10	.95	302	157
Ala.....	7	10	12.0	11.5	84	115	13	18	12.0	11.5	156	207	2.10	1.50	328	310
Miss.....	6	15	10.0	15.0	60	225	12	26	10.0	15.0	120	390	2.30	1.45	276	566
Ark.....	5	8	10.5	14.5	52	116	10	12	10.5	14.5	105	174	2.40	1.10	252	191
La.....	21	16	10.5	10.6	220	170	108	103	10.5	10.6	1,134	1,092	2.85	1.75	3,232	1,911
Okla.....	7	6	8.0	10.0	56	60	8	7	8.0	10.0	64	70	2.30	1.15	147	80
U. S.....	864	956	13.9	15.6	11,975	14,917	1,162	1,271	13.3	14.9	15,416	18,885	1.56	.63	23,966	11,919

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Acres from which all or part of the beans grown were gathered.<sup>2</sup> Including acres planted in corn reduced to equivalent solid acres as well as the acreage grown alone.<sup>3</sup> Including beans grazed or otherwise utilized as well as those gathered.<sup>4</sup> Total production (except hay) multiplied by price of gathered beans to give approximate total valueTABLE 268.—*Soybeans: Production in specified countries, 1920-21 to 1931-32*

Crop year	United States	Man- churia <sup>1</sup>	Chosen	Japan	Dutch East Indies
	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels
1921-22.....	2,815	65,000	23,053	21,200	3,631
1922-23.....	<sup>2</sup> 4,329	109,067	23,117	18,624	3,858
1923-24.....	<sup>2</sup> 6,541	88,867	23,760	17,578	3,574
1924-25.....	<sup>2</sup> 5,690	92,667	18,723	13,758	3,536
1925-26.....	<sup>2</sup> 5,102	116,667	23,609	18,473	3,933
1926-27.....	<sup>2</sup> 6,517	135,000	22,276	12,512	3,672
1927-28.....	<sup>2</sup> 7,469	163,319	24,300	16,704	3,971
1928-29.....	8,688	177,804	19,507	15,239	4,298
1929-30.....	8,670	178,389	20,430	13,592	3,917
1930-31.....	11,975	193,564	22,601	.....	4,468
1931-32.....	14,917	<sup>3</sup> 211,642	.....	.....	.....

Bureau of Agricultural Economics. Compiled from official sources.

<sup>1</sup> Manchuria produces about 97 per cent of the bean production of China. Production figures for China are not available.<sup>2</sup> Subject to revision.<sup>3</sup> Preliminary.

TABLE 269.—*Soybeans and soybean oil: International trade, average 1925-1929, annual 1928-1930*

## SOYBEANS

Country	Calendar year							
	Average, 1925-1929		1928		1929		1930 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
China <sup>2</sup> .....	3,731,214	0	4,780,513	0	5,468,725	0	3,810,478	0
PRINCIPAL IMPORTING COUNTRIES								
Germany.....	0	1,390,622	0	1,868,891	0	2,257,198	0	1,959,417
Japan.....	5,574	1,015,825	5,714	1,040,128	5,738	1,261,690	4,938	953,772
Denmark.....	0	394,965	0	472,469	0	518,753	0	388,593
United Kingdom.....	0	305,643	0	429,014	0	454,689	0	204,532
Sweden.....	0	166,799	0	199,528	0	221,281	2	108,817
Italy.....	342	97,395	9	141,478	110	194,652	10	17,733
Netherlands.....	1,192	58,510	463	40,180	497	108,304	328	42,394
United States <sup>4</sup> .....	0	4,064	0	4,256	0	4,337	0	3,852
Total.....	6,808	3,433,823	6,186	4,195,944	6,335	5,020,854	5,278	3,678,614

## SOYBEAN OIL

PRINCIPAL EXPORTING COUNTRIES								
China.....	244,894	0	125,625	0	148,673	0	251,909	0
Germany.....	45,828	30,004	73,140	2,466	103,802	4,376	49,520	28,833
Denmark.....	36,742	3,670	48,466	1,267	43,690	699	28,609	2,044
Japan.....	14,393	823	10,870	1,842	14,739	1,500	34,157	1,214
Sweden.....	12,917	10,182	16,796	10,019	15,911	10,434	4,916	13,254

Bureau of Agricultural Economics. Official sources except where otherwise noted.

<sup>1</sup> Preliminary.

<sup>2</sup> These figures are for yellow beans, including mostly soybeans, according to Agricultural Commissioner Paul O. Nyhus.

<sup>3</sup> 3-year average.

<sup>4</sup> Imports for consumption.

<sup>5</sup> International Yearbook of Agricultural Statistics.

<sup>6</sup> 4-year average.

TABLE 270.—*Soybeans: Estimated average price per bushel, received by producers, United States, 1922-23 to 1931-32*

Season beginning October—	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Weighted average
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
1922-23.....	1.89	2.06	1.97	2.07	2.13	2.00
1923-24.....	2.09	2.11	2.11	2.23	2.26	2.12
1924-25.....	2.23	2.16	2.36	2.59	2.64	2.29
1925-26.....	2.27	2.18	2.17	2.38	2.33	2.23
1926-27.....	1.97	1.85	1.83	1.90	2.05	1.89
1927-28.....	1.86	1.70	1.61	1.70	1.69	1.72
1928-29.....	1.72	1.69	1.70	1.82	1.93	1.72
1929-30.....	1.79	1.70	1.72	1.55	1.91	1.75
1930-31.....	1.64	1.48	1.44	1.46	1.40	1.60
1931-32.....	.58	.52	.61			

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weight, and monthly prices by estimated monthly marketings. For previous data see 1930 or earlier Yearbooks.

# STATISTICS OF MISCELLANEOUS CROPS

749

TABLE 271.—*Soybeans for seed: Average wholesale selling price per bushel at Baltimore and St. Louis, 1922-1931*

Year	Baltimore						St. Louis					
	Jan.	Feb.	Mar.	Apr.	May	Average	Jan.	Feb.	Mar.	Apr.	May	Average
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1922.....	1.90	2.10	2.10	2.10	2.00	2.04	2.40	2.40	2.50	2.30	2.75	2.47
1923.....	2.40	2.40	2.40	2.30	2.25	2.35	8.00	2.85	2.70	2.70	2.95	2.84
1924.....	2.10	2.40	2.40	2.70	3.00	2.52	2.80	2.80	2.80	2.80	2.75	2.79
1925.....	2.85	2.95	3.15	2.95	2.35	2.85	2.40	2.40	2.40	2.25	2.10	2.31
1926.....	2.00	2.05	2.10	2.15	2.75	2.21	2.15	2.15	2.30	2.55	2.60	2.41
1927.....	1.80	1.80	1.80	1.80	1.85	1.81	2.70	2.70	2.40	2.50	2.70	2.60
1928.....	1.95	1.90	1.95	1.95	2.15	1.98	1.80	1.80	1.85	2.00	2.25	1.94
1929.....	2.25	2.35	2.40	2.40	2.70	2.42	2.55	2.55	2.60	2.75	2.85	2.66
1930.....	2.10	2.10	2.10	2.25	2.65	2.24	2.15	2.25	2.25	2.25	2.25	2.28
1931.....	2.25	2.25	2.25	2.25	2.25	2.25	1.80	1.80	1.80	1.80	1.95	1.83

Bureau of Agricultural Economics. Compiled from weekly reports to the bureau from seedsmen in the various markets. These prices are the average wholesale selling prices for high-quality seed.

TABLE 272.—*Soybean oil: Quantity of beans crushed and quantity of crude oil produced, 1922-23 to 1930-31*

Year beginning October	Soybeans crushed					Oil produced				
	Oct.-Dec.	Jan.-Mar.	Apr.-June	July-Sept.	Total	Oct.-Dec.	Jan.-Mar.	Apr.-June	July-Sept.	Total
	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
1922-23.....	2,708	3,876	2,350	594	9,528	364	768	272	78	1,482
1923-24.....	2,230	3,232	564	102	6,128	266	388	72	13	759
1924-25.....	3,550	7,478	3,038	4,336	18,402	477	870	360	562	2,269
1925-26.....	5,486	7,746	7,450	3,588	21,040	728	990	874	46	2,638
1926-27.....	5,132	6,804	6,032	2,104	20,072	735	862	776	286	2,659
1927-28.....	8,788	10,278	8,792	5,654	33,512	1,164	1,260	1,132	789	4,374
1928-29.....	11,480	21,190	9,066	10,560	52,896	1,506	3,046	1,277	1,456	7,285
1929-30.....	30,658	25,288	20,716	14,324	90,986	5,231	3,343	2,905	1,945	13,424
1930-31.....	43,546	64,630	77,346	58,432	243,954	6,194	9,086	10,996	8,391	34,667

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census, "Animal and vegetable fats and oils."

TABLE 273.—*Soybean oil, crude, in barrels: Wholesale price per pound, Saturday nearest the 15th of the month, New York, 1922-1931*

Calendar year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1922.....	8.88	9.12	10.88	11.38	13.12	12.62	11.88	11.62	11.62	10.90	10.38	10.88
1923.....	11.19	11.69	12.62	13.12	13.12	12.62	11.88	11.62	11.62	10.88	11.00	11.88
1924.....	11.62	12.50	12.50	11.75	12.38	12.00	12.38	12.50	12.75	12.25	13.12	13.38
1925.....	13.25	13.25	13.25	13.38	13.38	13.38	13.38	13.38	13.38	13.38	13.38	13.38
1926.....	13.38	13.38	13.38	13.38	13.38	13.50	14.00	14.00	14.00	14.00	13.00	12.00
1927.....	12.00	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12	12.12
1928.....	12.12	12.12	12.12	12.12	12.12	12.38	12.38	12.38	12.38	12.38	12.38	12.38
1929.....	12.38	12.38	12.38	12.00	11.75	11.75	11.12	11.12	11.12	11.62	12.62	12.25
1930.....	12.25	12.25	11.38	11.38	11.12	10.88	10.88	10.88	10.88	10.88	10.12	10.12
1931.....	10.12	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75

Bureau of Agricultural Economics. Compiled from the Oil, Paint, and Drug Reporter. See 1930 Year-book, p. 798, Table 300, for data for earlier years.

<sup>1</sup> Beginning October, 1929, reported as imported.

TABLE 274.—*Cowpeas: Acreage, production, and value, by States, 1930 and 1931*

State	Peas gathered						Total, except hay						Farm price Dec. 1 of peas gathered		Value of total pro- duction except hay <sup>4</sup>	
	Acres from which gathered <sup>1</sup>		Peas gathered per acre		Total quantity gathered		Total acres <sup>2</sup>		Yield per acre <sup>3</sup>		Total pro- duction <sup>3</sup>					
	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931		
	1,000 acres	1,000 acres	Bus.	Bus.	1,000 bus.	1,000 bus.	1,000 acres	1,000 acres	Bus.	Bus.	1,000 bus.	1,000 bus.	Dolls. p. bus.	Dolls. p. bus.	1,000 dolls.	1,000 dolls.
Ind.....	5	6	8.5	10.5	42	63	5	6	8.5	10.5	42	63	1.90	0.70	80	44
Ill.....	41	59	6.5	10.0	268	590	41	59	6.5	10.0	268	590	1.75	.65	466	384
Mo.....	16	18	8.0	11.5	128	207	16	18	8.0	11.5	128	207	2.20	.95	282	197
Kans.....	1	1	5.5	6.0	6	6	1	1	5.5	6.0	6	6	1.70	1.75	10	10
Del.....	1	2	6.0	11.0	6	22	1	2	6.0	11.0	6	22	2.40	1.00	14	22
Md.....	1	1	5.0	10.0	5	10	1	1	5.0	10.0	5	10	2.35	1.20	12	12
Va.....	6	7	6.0	11.0	36	77	10	13	6.0	11.0	60	143	2.90	1.00	174	143
N. C.....	17	34	11.0	12.0	187	408	45	82	11.0	12.0	495	984	2.10	.80	1,040	787
S. C.....	78	109	8.5	8.5	663	926	107	153	8.5	8.5	910	1,300	1.80	.65	1,638	845
Ga.....	47	80	9.0	9.5	423	760	75	136	9.0	9.5	675	1,292	2.00	.95	1,350	1,227
Fla.....	8	8	10.0	9.8	80	78	21	21	10.0	9.8	210	206	2.45	1.25	514	258
Ky.....	4	6	8.5	11.5	34	69	8	12	8.5	11.5	68	138	2.20	.90	150	124
Tenn.....	26	36	5.0	5.5	130	198	26	36	5.0	5.5	130	198	2.10	.80	273	158
Ala.....	53	95	9.0	11.0	477	1,045	55	100	9.0	11.0	495	1,100	1.85	.75	918	825
Miss.....	32	54	9.0	10.0	288	540	42	69	9.0	10.0	378	690	2.00	.95	756	656
Ark.....	21	37	9.0	13.0	189	481	47	71	9.0	13.0	423	923	2.15	1.10	909	1,015
La.....	17	22	10.3	11.0	175	242	35	46	10.3	11.0	360	506	2.00	1.65	986	835
Okla.....	13	20	6.0	11.0	78	220	23	35	6.0	11.0	138	385	2.40	1.20	331	462
Tex.....	66	90	9.8	11.0	637	990	115	155	9.8	11.0	1,127	1,705	1.90	1.00	2,141	1,705
U. S.....	452	685	8.5	10.1	3,850	6,932	674	1,016	8.8	10.3	5,922	10,468	2.02	.93	11,992	9,709

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Acres from which all or part of the peas grown were gathered.<sup>2</sup> Including acres planted in corn reduced to equivalent solid acres as well as the acreage grown alone. Acreage cut for hay is included in table of legume hay.<sup>3</sup> Including peas grazed or otherwise utilized as well as those gathered.<sup>4</sup> Total production (except hay) multiplied by price of gathered peas to give approximate total value.TABLE 275.—*Cowpeas: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32*

Crop year	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weighted average
	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1922-23.....	1.66	1.67	1.54	1.64	1.67	1.87	1.98	1.98	2.08	2.08	2.17	2.21	1.73
1923-24.....	2.08	1.87	1.94	1.95	2.01	2.12	2.21	2.32	2.46	2.53	2.82	2.86	2.14
1924-25.....	2.56	2.41	2.32	2.34	2.56	2.82	3.16	3.43	3.67	3.70	3.84	3.67	2.73
1925-26.....	3.24	3.12	2.93	2.98	2.87	3.03	3.21	3.37	3.50	3.43	3.47	3.47	3.09
1926-27.....	3.22	2.79	2.34	2.05	1.95	1.94	1.94	1.89	1.93	1.90	1.90	1.93	2.21
1927-28.....	1.84	1.80	1.70	1.72	1.65	1.71	1.74	1.76	1.86	2.00	2.09	2.09	1.80
1928-29.....	2.01	1.83	1.83	1.83	2.02	2.15	2.45	2.63	2.88	3.05	3.24	3.19	2.18
1929-30.....	2.99	2.49	2.30	2.22	2.28	2.40	2.59	2.73	2.85	2.93	3.00	2.93	2.48
1930-31.....	2.66	2.41	2.20	2.05	1.86	1.80	1.75	1.82	1.87	1.93	1.96	1.89	2.10
1931-32.....	1.63	1.27	.98	.98	.93	-----	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Based upon returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by estimated monthly marketings. For previous data see 1930 or earlier Yearbooks.

## STATISTICS OF MISCELLANEOUS CROPS

751

TABLE 276.—*Cowpeas for seed: Average wholesale selling price per bushel at Baltimore and St. Louis, 1922-1931*

Year	Baltimore						St. Louis					
	January	February	March	April	May	Average	January	February	March	April	May	Average
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1922.....	2.20	2.40	2.40	2.40	2.40	2.30	1.90	1.90	2.20	2.25	2.25	2.10
1923.....	2.55	2.55	2.55	2.55	2.55	2.55	3.00	2.95	2.85	2.85	2.95	2.90
1924.....	3.00	3.30	3.15	3.40	3.45	3.20	2.75	2.95	3.00	3.05	3.55	3.00
1925.....	3.90	3.90	3.90	3.90	3.95	3.91	3.90	4.00	4.10	4.10	4.10	4.04
1926.....	4.25	4.25	4.25	4.25	4.20	4.24	4.50	4.45	4.20	4.10	4.05	4.25
1927.....	2.25	2.25	2.15	2.10	2.10	2.17	2.40	2.40	2.40	2.40	2.40	2.40
1928.....	1.30	1.80	2.05	2.20	2.30	2.03	2.40	2.40	2.40	2.50	2.70	2.48
1929.....	2.85	3.30	3.75	3.75	3.75	3.48	3.50	3.60	3.60	3.70	3.75	3.63
1930.....	3.30	3.30	3.30	3.30	3.30	3.30	3.15	3.15	3.15	3.10	3.00	3.11
1931.....	3.00	2.90	2.50	2.50	2.55	2.69	2.40	2.40	2.40	2.40	2.55	2.43

Bureau of Agricultural Economics. Compiled from weekly reports to the bureau from seedsmen in the various markets. These prices are the average wholesale selling prices for high-quality seed.

TABLE 277.—*Velvet beans: Acreage, production, and December 1 price, by States, 1929-1931*

State	Total acres for all purposes			Yield per acre of beans in the hull <sup>1</sup>			Total production of beans in the hull <sup>1</sup>			Price per ton received by producers Dec. 1		
	1929	1930	1931 <sup>2</sup>	1929	1930	1931	1929	1930	1931 <sup>2</sup>	1929	1930	1931
	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>1,000 short tons</i>	<i>1,000 short tons</i>	<i>1,000 short tons</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
South Carolina.....	67	67	40	1,000	1,100	960	34	37	19	16.00	15.70	10.55
Georgia.....	649	604	506	880	880	600	286	266	167	13.50	13.50	9.70
Florida.....	136	122	127	900	650	800	61	40	51	13.50	13.00	9.35
Alabama.....	206	340	306	780	580	700	115	99	107	14.00	13.50	9.70
Mississippi.....	38	35	32	1,480	950	1,380	28	17	22	16.00	10.00	11.20
Louisiana.....	33	33	33	1,150	650	950	19	11	16	16.00	16.00	11.20
United States.....	1,219	1,201	1,044	890.9	782.7	731.8	543	470	382	13.98	13.78	9.88

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> The figures refer to the yield and entire production of velvet beans in the hull and not merely to those gathered. The pods are gathered from one-fourth to one-third of the acreage and most of these are ground for feed, only enough being shelled to supply seed. A large proportion of the crop is grazed.

<sup>2</sup> Preliminary.

TABLE 278.—*Broomcorn: Acreage, production, and November 15 price, United States, 1915-1931*

Year	Acreage	Average yield per acre	Production	Price per ton received by producers Nov. 15	Year	Acreage	Average yield per acre	Production	Price per ton received by producers Nov. 15
	<i>Acres</i>	<i>Pounds</i>	<i>Short tons</i>	<i>Dollars</i>		<i>Acres</i>	<i>Pounds</i>	<i>Short tons</i>	<i>Dollars</i>
1915.....	230,100	454.1	53,242	91.67	1924.....	436,000	356.7	77,800	95.81
1916.....	235,200	329.3	38,728	172.75	1925.....	214,000	275.7	29,500	143.02
1917.....	345,000	332.8	57,400	292.75	1926.....	306,000	355.6	54,400	78.77
1918.....	366,000	340.4	63,300	233.87	1927.....	237,000	337.6	40,000	109.50
1919.....	352,000	303.4	53,400	154.57	1928.....	298,000	363.1	54,100	104.21
1920.....	275,500	265.0	38,500	126.16	1929.....	310,000	305.2	47,300	122.83
1921.....	222,000	344.2	35,200	72.20	1930.....	391,000	254.7	49,800	73.61
1922.....	275,000	271.3	37,300	219.46	1931 <sup>2</sup> .....	309,000	310.0	47,900	51.15
1923.....	536,000	302.8	81,153	100.06					

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Weighted average of the season to Dec. 1.

<sup>2</sup> Dec. 1, price.

<sup>3</sup> Preliminary.

TABLE 279.—*Broomcorn: Acreage, production, and December 1 price, by States 1928-1931*

State	Acreage				Average yield per acre				Production				Price per ton received by producers Dec. 1			
	1928	1929	1930	1931 <sup>1</sup>	1928	1929	1930	1931	1928	1929	1930	1931 <sup>1</sup>	1928	1929	1930	1931
	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Dols.</i>	<i>Dols.</i>	<i>Dols.</i>	<i>Dols.</i>
Ill.....	21	21	28	33	440	502	555	600	4,600	5,300	7,800	9,900	145	175	110	67
Mo.....	4	1	1	1	430	300	220	320	900	200	100	200	90	90	85	60
Kans.....	43	50	60	24	450	280	246	298	9,700	7,000	7,400	8,600	96	115	60	50
Okla.....	131	125	164	151	350	287	208	250	22,900	17,900	17,100	19,600	111	120	82	52
Tex.....	9	10	10	11	311	294	285	300	1,400	1,500	1,400	1,600	107	112	75	41
Colo.....	52	64	77	46	360	286	270	250	9,400	9,200	10,400	5,600	85	112	51	42
N. Mex.....	38	39	51	43	272	319	220	335	5,200	6,200	5,600	7,200	90	115	57	37
U. S.....	298	310	391	309	363.1	305.2	254.7	310.0	54,100	47,300	49,800	47,900	104.21	122.83	73.61	51.15

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.TABLE 280.—*Broomcorn: Supply and distribution, 1924-1931*

	Year beginning June—							
	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32
Supply:								
Stocks June 1—	<i>Tons</i>	<i>Tons</i>	<i>Tons</i>	<i>Tons</i>	<i>Tons</i>	<i>Tons</i>	<i>Tons</i>	<i>Tons</i>
Manufacturers.....	15,189	20,960	16,201	18,173	15,744	19,591	14,980	17,088
Dealers <sup>1</sup> .....	15,489	25,043	9,709	11,496	5,938	7,495	6,667	4,566
On farms.....	6,133	6,024	3,265	2,709	1,206			2,326
Total carry-over.....	36,791	52,027	29,172	32,380	22,888	27,090	22,690	23,980
Production.....	78,200	29,500	54,400	40,000	54,100	47,300	49,900	47,900
Imports.....	136	( <sup>2</sup> )	( <sup>2</sup> )	193			( <sup>2</sup> )	
Total supply available.....	115,127	81,527	83,572	72,573	79,988	75,209	72,490	71,880
Distribution:								
Exports.....	5,580	4,688	4,701	4,591	4,931	4,985	4,557	-----
Domestic use.....	57,520	47,667	46,491	41,894	47,148	47,534	43,953	-----
Stocks on hand May 31.....	52,027	29,172	32,380	25,888	27,909	22,690	23,980	-----

Bureau of Agricultural Economics.

<sup>1</sup> Storage stocks reported by dealers include manufacturers' stocks held by dealers at country shipping points.<sup>2</sup> Dec. 1 estimate.<sup>3</sup> Less than 100 tons.<sup>4</sup> For crop year, June 1-May 31.<sup>5</sup> Includes broomcorn destroyed by warehouse fire.<sup>6</sup> Not including possible imports.TABLE 281.—*Hay: Receipts at principal markets, 1924-25 to 1930-31*

Year beginning July	Boston	New York	Pittsburgh	Cincinnati	Chicago	Minneapolis	St. Louis	Kansas City	Omaha	San Francisco
	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>
1924-25.....	46,188	126,636	55,752	95,760	127,740	59,724	81,240	303,924	62,520	53,448
1925-26.....	35,340	97,080	49,980	43,752	117,372	45,782	82,392	318,000	62,268	49,032
1926-27.....	35,564	71,160	65,172	46,056	108,756	59,100	68,172	270,756	75,936	46,572
1927-28.....	32,400	45,996	42,720	71,052	91,728	41,340	53,592	240,720	64,300	37,200
1928-29.....	25,964	37,236	29,916	79,152	95,016	36,300	53,244	247,296	76,488	45,060
1929-30.....	21,708	53,768	26,232	67,392	70,308	33,072	60,120	216,852	65,320	47,268
1930-31.....	16,356	40,452	26,160	69,012	55,416	35,532	51,876	160,872	71,556	52,224

Bureau of Agricultural Economics. Compiled from weekly reports from the various markets to the Grain, Hay, and Feed Market News Service of the Bureau of Agricultural Economics.

TABLE 282.—*Hay: Acreage, production, December 1 price, exports, etc., United States, 1919-1931*

Year	Tame hay						Wild hay			
	Acreage	Average yield per acre	Production	Price per ton received by producers, Dec. 1	Domestic exports, year beginning July 1 <sup>1</sup>	Imports, year beginning July 1 <sup>1</sup>	Acreage	Yield per acre	Production	Price per ton received by producers, Dec. 1
	1,000 acres	Short tons	1,000 short tons	Dollars	1,000 short tons	1,000 short tons	1,000 acres	Short tons	1,000 short tons	Dollars
1919.....	65,863	1.34	74,724							
1919.....	59,020	1.35	75,357	20.19	67	252	17,124	0.93	15,891	16.52
1920.....	56,781	1.32	75,074	17.75	55	126	16,291	.95	15,533	11.38
1921.....	57,462	1.21	69,718	12.09	61	5	15,661	.88	13,811	0.57
1922.....	59,300	1.34	79,650	12.56	53	35	16,181	.90	14,501	7.80
1923.....	57,741	1.28	74,140	14.13	24	403	15,864	.90	14,312	8.16
1924.....	59,073									
1924.....	59,066	1.35	79,877	13.79	25	119	15,166	.83	12,601	7.92
1925.....	54,999	1.22	66,965	13.94	18	431	14,685	.79	11,643	8.55
1926.....	54,750	1.22	66,918	14.07	15	209	13,337	.68	9,098	10.04
1927.....	56,754	1.46	83,116	11.29	17	84	14,535	1.03	15,003	6.59
1928.....	53,287	1.35	71,920	12.23	14	40	12,924	.90	11,650	7.25
1929.....	55,019	1.38	76,114	12.19	9	60	13,556	.82	11,194	8.04
1930.....	52,022	1.21	63,463	12.62	7	136	13,793	.73	10,751	7.10
1931 <sup>2</sup> .....	53,449	1.20	64,283	9.06			11,977	.68	8,133	6.18

Bureau of Agricultural Economics. Italic figures are census returns; other acreage, production, and yield figures are estimates of the crop-reporting board. Revised, 1919 to 1928. See introductory text. See 1927 Yearbook, p. 927, for data for earlier years.

<sup>1</sup> Compiled from Commerce and Navigation of the United States, 1910-1917; Foreign Commerce and Navigation of the United States, 1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1926; January and June issues, 1927-1931, and official records of the Bureau of Foreign and Domestic Commerce.

<sup>2</sup> Preliminary.

TABLE 283.—*Hay, tame: Estimated price per ton received by producers December 1, average 1925-1929, and annual 1927-1931*

State	Av., 1925-1929	1927	1928	1929	1930	1931	State	Av., 1925-1929	1927	1928	1929	1930	1931
	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.		Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
Me.....	12.06	12.70	11.40	11.00	10.90	9.90	N. C.....	19.02	13.00	17.30	17.80	19.30	13.00
N. H.....	10.28	10.30	14.10	13.50	13.70	11.80	S. C.....	19.14	13.00	15.60	16.20	18.80	11.90
Vt.....	12.40	11.70	11.60	11.00	11.00	9.50	Ga.....	17.44	16.30	15.60	16.30	15.90	10.00
Mass.....	21.24	21.00	19.10	19.20	18.90	17.90	Fla.....	10.94	18.20	19.00	17.50	17.00	12.70
R. I.....	22.90	22.00	22.00	22.00	22.60	19.40	Ky.....	16.42	14.50	16.50	15.70	19.70	10.00
Conn.....	21.98	21.70	18.90	19.10	20.20	17.00	Tenn.....	17.60	15.00	16.90	17.50	20.10	11.00
N. Y.....	12.84	11.30	11.30	12.20	14.40	8.80	Ala.....	17.00	15.00	15.90	16.20	15.10	9.00
N. J.....	18.20	17.50	14.00	18.60	21.00	14.20	Miss.....	15.58	15.00	15.20	15.50	16.50	9.60
Pa.....	14.92	13.50	12.50	13.10	19.70	12.10	Ark.....	16.68	14.00	14.40	16.00	14.80	8.30
Ohio.....	12.02	9.20	11.70	10.00	17.40	6.00	La.....	15.06	13.80	14.40	13.60	13.50	8.80
Ind.....	12.40	10.40	12.00	10.10	14.60	6.80	Okla.....	13.02	10.70	12.70	13.70	10.40	6.70
Ill.....	13.50	11.40	12.90	11.30	13.10	7.70	Tex.....	13.82	11.80	13.20	13.30	12.50	7.80
Mich.....	12.72	11.00	11.60	10.70	16.30	8.00	Mont.....	10.04	8.40	8.90	12.40	11.00	9.00
Wis.....	13.28	12.50	14.40	10.50	12.70	11.20	Idaho.....	9.60	8.70	11.00	10.80	8.40	8.20
Minn.....	10.90	9.00	9.70	10.60	10.20	8.30	Wyo.....	9.74	9.00	10.10	12.20	9.10	9.20
Iowa.....	13.10	12.50	13.00	11.00	11.50	8.40	Colo.....	10.60	9.20	11.70	11.00	9.20	7.60
Mo.....	11.44	9.90	10.80	10.40	12.00	6.80	N. Mex.....	15.08	13.40	16.90	18.10	13.00	11.00
N. Dak.....	8.24	7.80	6.70	8.50	7.00	5.80	Ariz.....	16.08	14.40	18.00	18.00	13.00	9.00
S. Dak.....	9.70	7.60	8.20	8.70	8.50	8.00	Nev.....	9.00	9.20	11.70	10.40	7.50	10.70
Nehr.....	11.02	8.50	10.00	10.50	8.00	7.20	Utah.....	11.46	10.00	12.20	15.60	9.10	9.80
Kans.....	10.98	8.60	9.40	11.80	9.70	6.50	Wash.....	14.30	12.90	13.10	16.80	13.30	8.60
Del.....	17.78	16.50	16.40	17.50	22.50	11.00	Oreg.....	12.02	11.20	11.70	14.60	9.60	8.50
Md.....	16.32	15.40	13.50	13.70	22.80	12.00	Calif.....	13.94	12.50	14.50	16.40	10.90	10.20
Va.....	17.46	16.00	15.30	15.50	22.40	12.00							
W. Va.....	16.84	15.00	14.70	15.10	23.00	12.40	U. S.....	12.74	11.29	12.23	12.19	12.02	9.06

Bureau of Agricultural Economics. As reported by crop reporters.

TABLE 284.—Hay: Acreage, yield, and production, by States, averages, and annual 1930 and 1931

State and division	Acreage			Yield per acre			Production		
	Tame hay		Wild hay	Tame hay		Wild hay	Tame hay		Wild hay
	Aver- age, 1929- 1932	1930		Aver- age, 1929- 1932	1930		Aver- age, 1929- 1932	1930	
	1,000 acres	1,000 acres	1,000 acres	Short tons	Short tons	Short tons	1,000 short tons	1,000 short tons	1,000 short tons
Maine.....	1,067	977	962	0.86	0.89	0.98	947	898	947
New Hampshire.....	1,378	850	844	1.11	1.10	1.10	877	844	877
Vermont.....	912	912	907	1.00	1.19	1.34	1,213	1,083	1,213
Massachusetts.....	572	596	584	1.28	1.27	1.44	437	461	461
Rhode Island.....	37	35	34	1.18	1.17	1.29	44	41	44
Connecticut.....	287	259	260	1.16	1.31	1.29	340	323	340
New York.....	4,674	3,955	3,950	1.16	1.16	1.33	5,642	4,642	5,258
New Jersey.....	2,305	2,207	2,14	1.62	1.60	1.70	3,637	3,502	3,637
Pennsylvania.....	2,893	2,486	2,455	1.24	1.20	1.28	3,601	3,194	3,601
North Atlantic.....	10,963	9,625	9,493	1.14	1.15	1.28	12,989	10,997	12,179
Ohio.....	2,922	2,455	2,519	1.14	.76	1.27	3,161	1,839	3,196
Indiana.....	1,870	1,710	1,749	1.14	.83	1.15	2,179	1,416	2,017
Illinois.....	2,916	2,486	2,394	1.14	.99	1.15	3,428	2,463	3,073
Michigan.....	2,721	2,648	2,894	1.12	.97	1.06	3,043	2,460	3,544
Wisconsin.....	3,349	3,860	3,190	1.45	1.49	1.21	5,023	4,992	4,853
Minnesota.....	3,373	2,411	2,636	1.39	1.32	1.09	4,505	3,179	4,166
Iowa.....	3,110	3,099	2,910	1.22	1.36	1.14	3,949	3,214	3,312
Missouri.....	3,007	3,112	2,787	1.00	.72	1.00	3,817	2,634	3,067
North Dakota.....	1,307	1,571	1,769	1.27	.91	.70	2,105	1,076	2,083
South Dakota.....	1,124	1,178	1,195	1.26	1.19	.83	1,707	1,076	1,868
Nebraska.....	1,015	1,003	2,457	1.74	1.79	.77	2,032	1,022	2,032
Kansas.....	1,432	1,060	2,901	1.70	1.62	1.41	2,471	1,607	2,575
North Central.....	27,748	26,078	25,883	1.26	1.13	1.10	35,177	29,429	35,947
Delaware.....	69	69	63	1.37	1.00	1.08	100	60	106
Maryland.....	368	369	381	1.23	.84	1.23	524	309	469
Virginia.....	950	811	904	1.02	.62	1.10	966	424	983
West Virginia.....	752	620	648	1.05	.51	.60	835	317	650
North Carolina.....	616	623	715	.94	.85	.95	518	532	677
South Carolina.....	241	200	244	.76	.72	.74	159	144	178

State	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2443	2444	2445	2446	2447	2448	2449	2450	2451	2452	2453	2454	2455	2456	2457	2458	2459	2460	2461	2462	2463	2464	2465	2466	2467	2468	2469	2470	2471	2472	2473	2474	2475	2476	2477	2478	2479	2480	2481	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493	2494	2495	2496	2497	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2508	2509	2510	2511	2512	2513	2514	2515	2516	2517	2518	2519	2520	2521	2522	2523	2524	2525	2526	2527	2528	2529	2530	2531	2532	2533	2534	2535	2536	2537	2538	2539	2540	2541	2542	2543	2544	2545	2546	2547	2548	2549	2550	2551	2552	2553	2554	2555	2556	2557	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579	2580	2581	2582	2583	2584	2585	2586	2587	2588	2589	2590	2591	2592	2593	2594	2595	2596	2597	2598	2599	2600	2601	2602	2603	2604	2605	2606	2607	2608	2609	2610	2611	2612	2613	2614	2615	2616	2617	2618	2619	2620	2621	2622	2623	2624	2625	2626	2627	2628	2629	2630	2631	2632	2633	2634	2635	2636	2637	2638	2639	2640	2641	2642	2643	2644	2645	2646	2647	2648	2649	2650	2651	2652	2653	2654	2655	2656	2657	2658	2659	2660	2661	2662	2663	2664	2665	2666	2667	2668	2669	2670	2671	2672	2673	2674	2675	2676	2677	2678	2679	2680	2681	2682	2683	2684	2685	2686	2687	2688	2689	2690	2691	2692	2693	2694	2695	2696	2697	2698	2699	2700	2701	2702	2703	2704	2705	2706	2707	2708	2709	2710	2711	2712	2713	2714	2715	2716	2717	2718	2719	2720	2721	2722	2723	2724	2725	2726	2727	2728	2729	2730	2731	2732	2733	2734	2735	2736	2737	2738	2739	2740	2741	2742	2743	2744	2745	2746	2747	2748	2749	2750	2751	2752	2753	2754	2755	2756	2757	2758	2759	2760	2761	2762	2763	2764	2765	2766	2767	2768	2769	2770	2771	2772	2773	2774	2775	2776	2777	2778	2779	2780	2781	2782	2783	2784	2785	2786	2787	2788	2789	2790	2791	2792	2793	2794	2795	2796	2797	2798	2799	2800	2801	2802	2803	2804	2805	2806	2807	2808	2809	2810	2811	2812	2813	2814	2815	2816	2817	2818	2819	2820	2821	2822	2823	2824	2825	2826	2827	2828	2829	2830	2831	2832	2833	2834	2835	2836	2837	2838	2839	2840	2841	2842	2843	2844	2845	2846	2847	2848	2849	2850	2851	2852	2853	2854	2855	2856	2857	2858	2859	2860	2861	2862	2863	2864	2865	2866	2867	2868	2869	2870	2871	2872	2873	2874	2875	2876	2877	2878	2879	2880	2881	2882	2883	2884	2885	2886	2887	2888	2889	2890	2891	2892	2893	2894	2895	2896	2897	2898	2899	2900	2901	2902	2903	2904	2905	2906	2907	2908	2909	2910	2911	2912	2913	2914	2915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TABLE 285.—Hay, tame, by kinds: Production by States, 1931<sup>1</sup>

State	Alfalfa	Clover and timothy <sup>2</sup>	Sweet-clover	Lespedeza (Japan clover)	Grains cut green for hay	Annual legumes	Millet, Johnson, Sudan grass, and other	All tame	Sorgo for forage and hay <sup>3</sup>
	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons
Maine.....	25	659	-----	-----	8	-----	255	947	-----
New Hampshire.....	10	245	-----	-----	12	-----	110	377	-----
Vermont.....	24	953	-----	-----	40	-----	196	1,213	-----
Massachusetts.....	19	362	-----	-----	10	-----	90	481	-----
Rhode Island.....	2	27	-----	-----	2	-----	13	44	-----
Connecticut.....	27	190	-----	-----	13	-----	93	323	-----
New York.....	83	4,158	-----	-----	72	9	510	5,288	-----
New Jersey.....	59	228	-----	-----	18	5	18	352	-----
Pennsylvania.....	251	2,764	-----	-----	20	21	108	3,154	-----
North Atlantic.....	980	9,576	-----	-----	195	35	1,393	12,179	-----
Ohio.....	427	2,574	35	-----	31	109	20	3,196	-----
Indiana.....	367	997	23	-----	51	525	54	2,017	-----
Illinois.....	576	1,265	29	-----	16	577	210	2,673	-----
Michigan.....	978	1,403	42	-----	28	9	84	2,544	-----
Wisconsin.....	813	2,947	26	-----	50	16	81	3,833	-----
Minnesota.....	1,163	1,130	128	-----	63	-----	272	2,766	-----
Iowa.....	1,061	1,959	65	-----	87	134	36	3,312	6
Missouri.....	808	1,730	24	-----	125	402	195	2,784	109
North Dakota.....	242	32	237	-----	494	-----	102	1,097	-----
South Dakota.....	256	30	31	-----	220	-----	21	558	9
Nebraska.....	1,606	114	46	-----	80	-----	186	2,032	200
Kansas.....	1,114	201	21	-----	37	23	149	1,545	900
North Central.....	8,911	14,282	707	-----	1,242	1,795	1,410	28,347	1,374
Delaware.....	20	60	-----	-----	5	15	6	106	-----
Maryland.....	62	312	-----	-----	16	63	16	469	-----
Virginia.....	88	527	-----	-----	48	216	114	993	4
West Virginia.....	18	474	-----	-----	26	30	102	650	-----
North Carolina.....	10	84	-----	49	76	351	108	677	26
South Carolina.....	3	-----	-----	-----	11	141	23	178	20
Georgia.....	7	2	-----	-----	17	284	50	360	36
Florida.....	-----	-----	-----	-----	-----	32	14	46	-----
South Atlantic.....	208	1,469	-----	49	198	1,132	433	3,479	88
Kentucky.....	175	443	-----	47	100	169	274	1,208	140
Tennessee.....	45	307	-----	130	68	292	333	1,175	125
Alabama.....	6	5	-----	5	13	335	113	477	65
Mississippi.....	59	3	-----	88	6	166	118	440	56
Arkansas.....	155	106	-----	29	82	161	168	701	153
Louisiana.....	45	-----	-----	36	2	124	72	279	17
Oklahoma.....	316	17	7	-----	48	62	118	568	348
Texas.....	145	-----	-----	-----	104	129	228	606	997
South Central.....	946	881	7	335	423	1,438	1,424	5,454	1,941
Montana.....	957	200	34	-----	254	-----	47	1,492	-----
Idaho.....	1,802	193	-----	-----	124	-----	32	2,161	-----
Wyoming.....	493	111	7	-----	64	-----	100	775	-----
Colorado.....	1,152	199	10	-----	150	20	116	1,617	165
New Mexico.....	266	14	-----	-----	36	-----	20	336	108
Arizona.....	338	-----	-----	-----	18	-----	8	364	-----
Utah.....	770	33	-----	-----	12	-----	16	831	-----
Nevada.....	182	18	-----	-----	5	-----	18	223	-----
Washington.....	624	391	-----	-----	606	-----	117	1,738	-----
Oregon.....	586	188	-----	-----	516	-----	248	1,538	-----
California.....	2,699	49	-----	-----	802	-----	129	3,079	-----
Western.....	9,809	1,396	51	-----	2,587	20	851	14,774	273
United States.....	20,914	27,594	705	334	4,645	4,420	5,511	64,283	3,676

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.<sup>2</sup> Excludes "sweetclover" and "Lespedeza."<sup>3</sup> Not included in "All tame hay."

## STATISTICS OF MISCELLANEOUS CROPS

757

TABLE 286.—Hay: Estimated average price per ton received by producers, United States, 1922-23 to 1931-32

## ALL (LOOSE)

Crop year	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	Weight- ed av- erage
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1922-23	11.44	10.78	10.68	10.87	11.38	11.82	11.98	12.04	12.18	12.54	12.82	12.32	11.68
1923-24	11.78	11.98	12.25	12.44	12.75	13.15	13.59	13.60	13.63	13.73	13.65	13.75	12.93
1924-25	13.49	12.95	12.68	12.64	12.88	12.69	12.70	12.83	12.39	12.48	12.17	11.82	12.70
1925-26	12.48	12.25	12.42	12.47	13.07	13.40	13.31	13.03	12.97	12.78	13.12	12.98	12.83
1926-27	12.90	13.04	12.88	13.08	13.22	13.47	13.38	13.64	13.48	13.26	13.20	13.10	13.23
1927-28	11.71	9.97	10.51	10.63	10.64	10.55	10.60	10.20	10.19	10.29	10.70	10.01	10.57
1928-29	10.86	10.39	10.59	10.60	10.89	11.23	11.61	12.06	12.37	12.30	12.15	11.88	11.29
1929-30	11.17	10.85	11.05	11.07	11.18	11.04	11.16	11.19	10.95	10.97	10.98	10.91	11.05
1930-31	10.47	11.31	12.14	12.17	12.19	11.33	11.21	10.92	10.66	10.59	10.54	9.97	11.29
1931-32	9.30	9.05	8.88	8.57	8.57	8.71	-----	-----	-----	-----	-----	-----	-----

## ALFALFA

1922-23	10.61	10.54	11.15	11.87	12.70	13.31	14.06	14.02	14.33	14.09	14.40	13.63	12.82
1923-24	12.45	12.01	12.78	13.37	13.59	14.39	13.99	14.08	13.98	14.09	14.12	13.70	13.54
1924-25	13.19	13.84	13.59	12.85	13.91	13.40	14.50	14.78	14.44	14.08	14.34	12.88	13.81
1925-26	13.02	13.00	12.91	13.41	13.74	14.14	13.90	14.24	13.50	13.53	13.17	13.33	13.52
1926-27	12.94	13.15	13.13	13.29	13.79	13.57	13.83	14.21	14.38	13.85	13.59	13.03	13.67
1927-28	11.73	11.47	11.34	11.52	11.75	12.02	12.09	11.84	12.46	12.56	12.90	12.42	11.96
1928-29	11.98	11.82	12.20	12.82	13.29	13.90	14.54	15.34	16.07	16.20	15.50	14.50	13.90
1929-30	13.12	13.17	13.50	13.84	14.00	14.41	14.66	14.45	13.90	13.42	12.87	12.14	13.71
1930-31	11.44	12.10	12.85	12.97	12.94	12.52	12.21	11.74	11.20	11.01	10.87	10.24	11.99
1931-32	9.80	9.86	9.67	9.58	9.94	10.31	-----	-----	-----	-----	-----	-----	-----

## CLOVER

1922-23	12.82	12.66	12.54	12.51	12.67	13.03	13.39	13.35	13.24	13.47	13.58	13.70	13.03
1923-24	13.52	13.51	14.12	14.73	14.94	15.52	15.51	15.93	16.31	16.08	15.92	15.95	15.14
1924-25	15.45	14.00	13.75	13.65	13.64	13.45	13.25	13.30	12.52	12.41	12.07	12.20	13.45
1925-26	13.03	13.67	14.06	14.09	14.74	15.24	14.79	14.62	14.79	14.64	15.13	15.07	14.52
1926-27	14.40	14.25	14.00	14.71	14.76	15.24	15.71	16.16	15.64	15.51	15.21	14.65	15.05
1927-28	13.11	12.16	11.78	11.91	11.86	11.51	12.02	12.24	11.96	12.23	12.51	12.63	12.13
1928-29	12.52	12.25	12.50	12.58	13.01	13.05	13.41	13.59	13.93	13.43	13.24	12.92	13.02
1929-30	11.00	11.61	11.82	11.77	11.52	11.97	12.24	12.24	12.31	12.27	12.19	12.25	11.90
1930-31	11.71	13.20	14.62	14.62	14.02	13.52	13.53	12.78	12.45	12.67	12.21	11.28	13.26
1931-32	10.30	10.15	9.81	9.65	9.65	9.70	-----	-----	-----	-----	-----	-----	-----

## TIMOTHY

1922-23	14.33	13.61	13.44	13.70	13.93	13.91	14.41	14.40	14.59	14.64	14.06	14.95	14.18
1923-24	14.86	14.68	15.13	16.22	16.78	16.95	16.96	17.25	17.53	17.53	17.48	17.52	16.53
1924-25	16.74	15.24	14.47	14.54	14.00	14.37	14.20	14.24	13.31	13.30	13.38	13.05	14.30
1925-26	13.89	14.06	14.98	15.11	15.38	15.87	15.82	15.79	15.59	15.81	16.31	16.64	15.40
1926-27	16.01	15.52	15.32	15.40	15.62	15.81	14.58	15.82	15.30	15.05	15.14	14.97	15.42
1927-28	13.29	12.03	11.70	11.88	11.67	11.31	11.34	11.03	11.14	11.17	11.75	11.82	11.61
1928-29	11.68	11.70	11.77	11.86	12.18	12.35	12.45	12.99	13.01	12.86	12.04	12.57	12.31
1929-30	11.91	11.61	11.60	11.67	11.70	11.57	11.55	11.55	11.67	11.79	12.04	12.29	11.71
1930-31	12.32	13.53	14.76	14.82	14.87	14.54	14.50	14.30	14.10	14.09	13.76	12.84	14.11
1931-32	10.77	10.07	9.79	9.56	9.34	9.14	-----	-----	-----	-----	-----	-----	-----

## PRAIRIE

1922-23	7.68	7.76	7.54	7.74	8.13	8.98	9.44	9.52	9.61	9.74	10.64	10.07	8.79
1923-24	9.17	8.97	8.58	9.19	9.07	9.26	8.54	8.87	8.66	8.78	8.74	8.54	8.92
1924-25	8.35	8.90	8.49	8.25	8.25	8.62	9.14	9.08	9.05	9.11	9.27	8.55	8.70
1925-26	8.93	8.55	9.24	9.41	9.39	9.78	9.78	9.33	9.48	9.08	9.54	9.99	9.36
1926-27	9.63	10.55	10.52	10.78	10.76	10.98	11.28	11.76	11.50	10.70	11.51	10.77	10.87
1927-28	9.15	8.65	7.98	7.67	7.47	7.55	7.41	6.98	6.79	6.90	7.32	7.59	7.64
1928-29	7.80	7.34	7.62	7.71	7.72	7.88	8.01	8.33	8.99	8.81	8.70	8.77	8.10
1929-30	8.21	7.96	8.13	7.97	8.11	8.18	8.30	8.41	8.11	8.12	7.96	7.78	8.12
1930-31	7.12	7.63	7.89	7.66	7.48	7.31	7.23	6.82	6.51	6.44	6.30	6.34	7.13
1931-32	6.52	6.64	6.68	6.52	6.67	6.56	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings. Mean of prices of all loose hay reported on 1st of month and 1st of succeeding month, July, 1922-December, 1923. For previous data on alfalfa, clover, timothy, and prairie hay see 1930 or earlier Yearbooks.

TABLE 287.—*Hay: Average price per ton at leading markets, by kind and grade, 1921-22 to 1930-31*

Year beginning July	Alfalfa, Kansas City		Clover, Cincinnati			Prairie upland, Kansas City		Timothy, Chicago	
	No. 1	No. 2	No. 1	No. 1, light mixed	No. 1, mixed	No. 1	No. 2	No. 1	No. 2
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
1921-22.....	19.75	13.90	19.80	19.00	17.80	11.70	10.00	22.30	18.50
1922-23.....	22.10	16.80	16.40	17.40	16.40	14.40	12.90	26.30	23.30
1923-24.....	23.60	16.90	23.90	23.40	22.60	13.90	12.60	23.90	19.50
1924-25.....	20.10	15.00	17.90	18.00	17.20	11.20	9.80	24.70	21.90
1925-26.....	21.10	17.40	22.50	23.60	22.60	14.20	12.80	21.80	19.70
1926-27.....	19.00	16.60	22.90	21.20	21.70	14.50	12.70	18.60	16.40
1927-28.....	20.80	16.00	-----	15.70	16.40	10.90	8.90	22.20	20.20
1928-29.....	24.80	22.70	-----	19.20	20.90	12.10	10.50	19.00	16.70
1929-30.....	22.10	17.90	17.20	18.00	17.60	11.70	10.30	20.10	18.50
1930-31.....	19.90	15.90	23.60	21.70	22.50	12.10	10.50		

Bureau of Agricultural Economics. Compiled from reports made direct to the bureau.

TABLE 288.—*Alfalfa meal, No. 1 medium: Average price per ton, bagged, in car lots, Kansas City, 1922-23 to 1931-32*

Crop year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Average
	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1922-23.....	18.60	19.50	21.20	24.60	26.25	26.20	25.40	25.40	24.40	26.50	26.10	23.40	24.00
1923-24.....	21.50	22.40	25.50	25.70	26.90	26.20	26.25	23.90	23.20	20.90	21.20	21.75	23.70
1924-25.....	22.00	22.60	23.25	23.10	22.50	23.90	24.20	22.50	22.25	22.00	22.70	22.90	22.80
1925-26.....	23.00	24.00	24.25	24.40	24.10	24.40	24.80	24.00	23.10	23.90	25.40	23.90	24.10
1926-27.....	23.00	22.80	22.25	22.40	22.90	22.80	22.00	21.75	21.40	21.00	22.20	21.60	22.10
1927-28.....	21.75	22.40	23.40	23.10	22.75	23.80	24.40	26.25	29.40	33.50	34.25	31.70	26.40
1928-29.....	27.60	26.60	26.00	26.60	26.60	28.60	29.75	29.90	28.50	28.00	27.00	25.10	27.40
1929-30.....	23.50	25.00	27.30	27.50	26.80	27.40	27.40	25.50	23.60	25.00	23.80	22.00	25.40
1930-31.....	22.70	24.70	26.60	25.60	25.00	24.20	23.60	21.25	20.40	21.00	19.60	18.10	22.70
1931-32.....	17.90	16.80	17.60	17.20	19.00	18.60	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Compiled from reports made to the bureau.

TABLE 289.—*Pasture: Condition, 1st of month, United States, 1909-1931*

Year	May	June	July	Aug.	Sept.	Oct.	Year	May	June	July	Aug.	Sept.	Oct.
	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.		P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
1909.....	78.1	84.9	91.8	86.4	-----	-----	1921.....	90.0	89.4	84.4	78.3	82.1	84.8
1910.....	86.9	87.1	79.7	71.5	-----	-----	1922.....	85.9	94.6	88.5	84.7	78.7	72.7
1911.....	83.1	82.7	67.2	62.7	-----	-----	1923.....	79.4	86.1	87.2	79.4	80.2	85.0
1912.....	82.9	92.5	89.7	67.3	-----	-----	1924.....	82.4	83.2	87.2	82.0	76.6	78.6
1913.....	85.5	88.1	81.6	74.3	-----	-----	1925.....	82.2	75.7	73.0	69.5	67.4	72.9
1914.....	88.9	90.0	83.0	76.2	-----	-----	1926.....	74.6	77.0	77.0	69.9	78.2	83.7
1915.....	88.4	92.5	93.2	95.5	97.7	95.9	1927.....	87.0	88.3	92.8	86.9	84.2	80.1
1916.....	84.8	90.8	94.8	84.5	79.8	76.9	1928.....	71.3	78.6	84.4	85.6	83.3	77.7
1917.....	79.9	83.1	84.1	78.5	77.5	75.5	1929.....	86.9	87.2	87.5	79.7	67.1	70.2
1918.....	81.6	89.3	82.0	72.4	67.7	73.5	1930.....	77.3	80.4	74.6	56.4	47.7	56.1
1919.....	91.1	97.4	95.8	85.3	81.6	78.9	1931.....	78.8	78.5	73.0	63.7	63.0	63.5
1920.....	79.3	90.2	91.4	87.7	88.1	88.9							

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

TABLE 290.—*Pasture: 1 Condition, 1st of month, by States, average 1920-1929, and 1931*

State and division	May		June		July		August		September		October	
	Average, 1920-1929	1931	Average, 1920-1929	1931	Average, 1920-1929	1931	Average, 1920-1929	1931	Average, 1920-1929	1931	Average, 1920-1929	1931
	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
Maine.....	86	86	88	90	87	93	86	91	82	87	79	91
New Hampshire.....	86	85	89	90	87	95	89	87	85	83	82	88
Vermont.....	86	86	88	93	91	96	93	95	89	90	87	89
Massachusetts.....	84	84	89	89	87	95	83	88	83	87	81	86
Rhode Island.....	84	80	89	87	88	88	84	88	82	90	80	83
Connecticut.....	82	82	88	91	87	95	82	90	82	88	82	82
New York.....	81	79	84	89	85	89	82	85	80	78	80	81
New Jersey.....	82	76	85	85	79	86	76	83	83	83	80	74
Pennsylvania.....	81	71	85	81	84	81	81	82	81	81	80	78
North Atlantic.....	81.8	77.4	85.5	86.6	85.0	87.4	82.5	85.1	81.6	81.2	80.2	80.9
Ohio.....	79	80	85	84	84	86	83	78	84	81	82	85
Indiana.....	79	80	85	81	85	81	78	70	81	70	81	79
Illinois.....	82	81	84	83	84	81	77	62	79	69	80	72
Michigan.....	72	68	84	76	83	77	75	52	72	41	78	66
Wisconsin.....	78	71	84	69	85	73	79	48	74	38	79	67
Minnesota.....	78	72	81	70	83	73	76	47	70	48	75	62
Iowa.....	84	80	83	72	86	70	81	50	84	44	88	63
Missouri.....	84	82	86	84	88	75	81	56	82	67	83	67
North Dakota.....	75	60	79	49	84	40	79	39	71	50	72	49
South Dakota.....	78	75	79	63	82	50	78	27	73	27	74	25
Nebraska.....	84	87	87	80	88	67	82	50	78	48	79	48
Kansas.....	83	88	86	88	87	80	83	68	78	69	82	60
North Central.....	80.9	79.1	84.1	77.3	85.3	73.3	79.9	55.9	78.5	55.2	80.7	62.7
Delaware.....	82	67	84	78	74	81	74	70	78	80	74	71
Maryland.....	79	64	82	72	77	77	74	81	79	83	77	80
Virginia.....	80	73	83	88	80	88	80	90	84	95	79	89
West Virginia.....	81	70	85	84	87	82	87	80	88	86	84	86
North Carolina.....	84	83	88	85	85	73	88	83	83	69	79	76
South Carolina.....	81	75	78	79	79	62	79	71	75	72	71	51
Georgia.....	82	79	82	77	82	49	83	66	77	69	72	52
Florida.....	80	83	81	78	87	66	90	76	90	80	86	78
South Atlantic.....	81.0	74.5	82.9	82.4	82.4	74.4	82.3	80.1	82.4	84.5	78.4	76.3
Kentucky.....	83	82	86	85	88	78	83	73	83	84	82	79
Tennessee.....	83	80	86	79	85	80	80	72	81	78	78	61
Alabama.....	83	77	84	79	82	57	80	70	76	76	70	51
Mississippi.....	84	80	85	79	85	73	80	86	78	85	73	66
Arkansas.....	83	83	87	81	85	78	80	83	74	87	74	66
Louisiana.....	84	80	86	83	87	70	82	77	79	78	77	63
Oklahoma.....	83	78	87	81	87	71	80	64	72	58	75	45
Texas.....	84	88	87	83	86	71	78	72	70	65	74	54
South Central.....	83.5	83.5	86.5	81.9	86.0	70.1	79.3	72.2	74.1	70.3	75.2	57.2
Montana.....	80	60	88	47	91	43	84	34	80	41	79	45
Idaho.....	86	81	92	79	89	75	84	60	81	58	80	62
Wyoming.....	87	80	96	77	98	74	83	54	91	63	80	60
Colorado.....	85	86	89	84	89	76	84	61	86	54	82	53
New Mexico.....	73	94	62	63	78	80	75	75	81	83	70	81
Arizona.....	84	88	82	86	79	85	80	80	85	90	84	87
Utah.....	86	80	92	75	87	58	84	45	83	48	82	44
Nevada.....	85	82	90	75	88	57	86	53	84	50	84	51
Washington.....	84	85	88	85	84	74	80	70	65	74	73	73
Oregon.....	90	87	93	82	90	82	84	70	78	63	78	65
California.....	85	88	83	89	81	88	79	53	78	51	76	51
Western.....	83.5	74.2	87.1	70.8	86.4	65.8	82.2	56.6	81.0	56.8	79.8	57.4
United States.....	81.9	78.8	85.0	78.5	85.3	73.0	80.6	63.7	78.6	63.0	79.3	63.5

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> For range States, conditions given as reported. Probably relates largely to farm pasture; i. e., range not included.

TABLE 291.—*Hops: Acreage, production, December 1 price, imports, exports, and consumption in the United States, 1922-23 to 1931-32*

Year beginning July	Acreage	Average yield per acre	Production	Price per pound received by producers Dec. 1	Imports <sup>1</sup>	Domestic exports <sup>1</sup>	Net exports <sup>1</sup>	Consumption by brewers <sup>2</sup>
	<i>Acres</i>	<i>Pounds</i>	<i>1,000 pounds</i>	<i>Cents</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
1922-23.....	23,400	1,186	27,744	8.6	1,205	13,497	12,401	4,556
1923-24.....	18,440	1,071	19,751	18.8	761	20,461	19,832	3,815
1924-25.....	20,850	1,360	27,670	10.3	439	16,122	15,737	3,256
1925-26.....	20,850	1,404	28,573	21.8	581	14,968	14,562	3,423
1926-27.....	20,800	1,516	31,522	23.1	470	13,869	12,936	3,149
1927-28.....	24,600	1,246	30,658	22.9	753	11,812	11,067	3,071
1928-29.....	26,200	1,257	32,944	19.3	649	8,836	8,198	2,735
1929-30.....	24,400	1,360	33,195	11.4	928	6,703	5,901	2,627
1930-31.....	19,500	1,202	23,447	14.8	1,026	5,593	4,583	2,197
1931-32 <sup>4</sup> .....	21,400	1,208	25,852	13.8				

Bureau of Agricultural Economics. Compiled from reports of the Division of Crop and Livestock Estimates, Bureau of Foreign and Domestic Commerce, records of the Bureau of Internal Revenue, 1922-23 to 1925-26; annual reports of the Commissioner of Prohibition, 1926-27 to 1929-30; and Commissioner of Industrial Alcohol, 1930-31.

<sup>1</sup> Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1922-1926; January and June issues, 1927-1931, and official records of the Bureau of Foreign and Domestic Commerce.

<sup>2</sup> Figures represent hops used to make cereal beverages.

<sup>3</sup> Not including 57,936 pounds in 1924, 71,508 pounds in 1925, 980 pounds in 1926, and 6,294 pounds in 1927 used in the manufacture of distilled spirits.

<sup>4</sup> Preliminary.

TABLE 292.—*Hops: Acreage, yield per acre, and production in specified countries, 1929-30 to 1931-32*

Country	Acreage			Yield per acre			Production		
	1929-30	1930-31	1931-32 <sup>1</sup>	1929-30	1930-31	1931-32	1929-30	1930-31	1931-32 <sup>1</sup>
North America:	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
Canada <sup>2</sup> .....	1,165	948		1,240	1,230		1,445	1,166	
United States <sup>2</sup> .....	24,400	19,500	21,400	1,360	1,202	1,208	33,195	23,447	25,852
Europe:									
England and Wales.....	23,986	19,997	19,536	1,677	1,718	1,055	40,219	28,336	18,928
Belgium.....	3,155	2,545	3,000	1,385	1,163	767	4,370	2,961	2,271
France.....	10,509	8,169		1,311	794		13,776	6,487	
Germany.....	37,619	32,306	25,387	799	754	404	30,074	24,366	12,544
Austria.....	731	170		360	365		263	62	
Czechoslovakia.....	41,330	38,440	30,000	630	843	824	26,053	32,431	24,725
Hungary.....	576	574		564	537		325	308	
Yugoslavia.....	12,629	7,139		797	543		10,065	3,873	3,024
Rumania.....	264	175		462			122		
Poland.....	6,264	5,671		613	583		3,842	3,307	3,920
Total European countries reporting all years.....	106,090	93,297	77,923				114,623	95,274	65,412
Oceania:									
Australia.....	1,398			1,674			2,340		
New Zealand.....	598			1,410			843		
Total countries reporting all years.....	130,490	112,797	99,323				147,818	118,721	91,264
Estimated world total, excluding Russia <sup>3</sup> .....	164,624	138,000					166,932	130,000	

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture except as otherwise stated. Acreage and production figures are for the harvesting season 1929 to 1931 in the Northern Hemisphere and 1929-30 to 1931-32 in the Southern Hemisphere.

<sup>1</sup> Preliminary.

<sup>2</sup> British Columbia.

<sup>3</sup> Principal producing States.

<sup>4</sup> These figures include the acreage left unpicked, which was estimated at 3,500 acres in 1930 and 1,600 acres in 1931.

<sup>5</sup> Yield based on acreage picked.

<sup>6</sup> Unofficial estimate.

<sup>7</sup> Exclusive of acreage and production in minor producing countries for which no data are available.

# STATISTICS OF MISCELLANEOUS CROPS

761

TABLE 203.—*Hops: International trade, average 1925-1929, annual 1927-1930*

Country	Calendar year									
	Average 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports
PRINCIPAL EXPORTING COUNTRIES	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Czechoslovakia.....	15,936	1,228	17,904	1,139	14,452	1,644	18,711	374	19,890	11
United States.....	12,654	612	14,119	554	7,985	581	7,677	765	7,640	1,099
Yugoslavia.....	9,427	231	9,030	274	16,929	198	7,269	218	5,968	167
France.....	5,601	4,458	5,082	5,407	3,612	4,338	3,438	4,000	2,669	4,516
Poland.....	3,552	447	3,343	503	4,699	266	5,708	636	4,570	475
New Zealand.....	387	6	530	4	408	1	286	1	204	1
Russia <sup>2</sup> .....	346	126	2	2	1,569	0	161	0	9	7
Australia <sup>3</sup> .....	269	208	397	145	618	157	131	121	15,164	12,376
Total.....	48,172	7,316	51,507	8,118	50,272	7,285	43,361	6,715	56,112	18,653
PRINCIPAL IMPORTING COUNTRIES	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Germany.....	2,964	11,408	3,825	10,722	3,092	9,967	5,080	8,011	5,721	6,190
United Kingdom.....	4,672	7,855	6,119	10,855	1,977	7,412	1,478	6,967	2,498	4,950
Irish Free State.....	0	5,997	0	5,174	0	5,852	0	5,624	0	5,874
Belgium.....	2,173	5,300	1,853	4,480	1,433	6,321	419	6,444	370	7,171
Austria.....	117	3,082	62	2,929	201	3,088	68	3,362	37	3,074
Canada.....	387	2,674	709	1,962	488	2,397	260	2,823	210	3,386
Netherlands.....	80	1,273	24	1,556	50	1,246	28	1,072	24	1,470
Brazil.....	0	1,101	0	1,075	0	1,261	0	1,238	0	913
Switzerland.....	0	1,097	0	1,072	0	1,189	0	1,418	0	1,203
Sweden.....	0	1,081	1	1,267	0	1,057	0	1,114	1	1,261
Argentina.....	0	1,051	0	1,042	0	1,241	0	831	0	1,224
Japan.....	0	906	0	1,011	0	1,002	0	828	0	1,158
Denmark.....	1	814	0	811	0	896	1	877	1	1,214
Italy.....	8	672	0	626	10	743	1	442	5	540
Union of South Africa.....	0	530	0	700	0	406	0	402	0	513
Norway.....	0	334	0	346	0	190	0	360	0	255
Hungary.....	121	310	146	444	188	278	69	198	85	135
British India.....	0	166	0	148	0	129	0	172	0	114
Total.....	10,533	45,553	12,739	46,258	7,439	44,774	7,470	42,708	8,058	40,780

Bureau of Agricultural Economics. Official sources except where otherwise noted. Lupulin and hopfen-mehl (hop meal) are not included when given separately.

<sup>1</sup> Preliminary.

<sup>2</sup> International Yearbook of Agriculture Statistics.

TABLE 204.—*Peanuts: Acreage, yield per acre, production, and December 1 price, United States, 1919-1931*

Year	Peanuts, all			Peanuts gathered			
	Total acreage <sup>1</sup>	Yield per acre	Total production <sup>2</sup>	Area	Yield per acre	Total quantity gathered	Farm price, Dec. 1 <sup>3</sup>
	1,000 acres	Pounds	1,000 lbs.	1,000 acres	Pounds	1,000 lbs.	Cents
1919.....				1,132	691.9	783,273	9.33
1920.....				1,181	712.5	841,474	5.26
1921.....				1,214	683.1	829,307	3.99
1922.....				1,005	630.0	633,114	4.68
1923.....				896	722.9	647,762	6.78
1924.....	1,830	615.3	1,125,933	1,187	627.7	745,059	4.60
1925.....	1,563	666.4	1,041,514	958	729.1	694,475	3.64
1926.....	1,315	669.1	879,923	843	749.5	631,825	4.54
1927.....	1,786	735.0	1,312,643	1,142	757.0	864,549	3.98
1928.....	1,930	661.2	1,276,078	1,211	706.1	855,096	4.44
1929.....	2,001	670.4	1,341,416	1,380	703.3	966,448	3.63
1930.....	1,862	632.0	1,176,700	1,133	659.4	747,085	3.25
1931 <sup>4</sup> .....	2,172	715.7	1,554,410	1,419	763.3	1,083,110	4.88

Bureau of Agricultural Economics. Estimates of the crop-reporting board. See 1930 Yearbook, p. 813, for data for earlier years.

<sup>1</sup> Including acres planted in corn reduced to equivalent solid acres as well as the acreage grown alone.

<sup>2</sup> Including peanuts grazed or otherwise utilized as well as those gathered.

<sup>3</sup> Farm prices are as of Nov. 15, 1919-1923; Dec. 1, 1924-1931.

<sup>4</sup> Average of State prices weighted by total production

<sup>5</sup> Preliminary.

TABLE 295.—*Peanuts: International trade, average 1925-1929, annual 1928-1930*

Country	Calendar year							
	Average, 1925-1929		1928		1929		1930 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
British India.....	1,320,173	0	1,676,871	0	1,823,689	0	1,322,041	0
Senegal.....	951,087	66	911,494	20	896,867	131	1,120,411	5
China.....	408,782	42,314	276,447	108,968	272,645	55,718	582,081	16,968
Nigeria.....	266,702	0	231,081	0	330,079	0	327,868	0
French possessions in China.....	251,847	0	287,039	0	0	0	0	0
Gambia.....	134,328	0	166,750	0	126,235	0	167,465	0
Dutch East Indies.....	61,251	785	104,402	1,018	60,153	818	45,242	749
Mozambique.....	54,487	21	76,360	5	50,538	68	54,897	81
Tanganyika.....	25,728	0	23,733	0	17,894	0	55,238	0
Anglo-Egyptian Sudan.....	12,732	0	4,001	0	8,858	0	10,659	0
French Guiana.....	10,722	2	14,716	0	11,232	0	4,824	0
Spain.....	3,252	0	2,572	0	2,849	0	2,834	0
Brazil.....	439	0	60	0	238	0	36	0
Total.....	3,501,480	43,138	3,755,526	110,009	3,604,977	56,735	3,696,596	17,803
PRINCIPAL IMPORTING COUNTRIES	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
France.....	12,863	1,619,507	10,469	1,731,759	11,707	1,891,117	5,088	1,957,755
Germany.....	0	1,311,186	0	1,883,601	0	2,050,751	0	2,023,086
United Kingdom.....	0	296,186	0	323,247	0	388,223	0	346,993
Italy.....	99	252,836	59	305,733	72	376,983	111	135,764
Netherlands.....	3,278	203,972	3,065	165,465	3,046	203,543	2,890	241,825
United States.....	4,569	75,568	5,419	97,533	4,880	44,555	2,959	10,470
Belgium.....	244	61,350	266	69,203	187	69,344	140	52,435
Denmark.....	0	40,102	0	51,033	0	61,719	0	69,429
British Malaya.....	12,361	30,890	35,255	54,204	9,872	28,607	3,573	21,387
Canada.....	0	29,783	0	31,408	0	34,961	0	29,876
Japan.....	885	26,603	658	26,080	140	33,131	150	36,471
Sweden.....	0	16,065	0	23,582	0	14,469	0	14,940
Algeria <sup>2</sup> .....	313	10,025	252	11,713	178	13,469	135	10,954
Egypt.....	2,599	6,894	2,113	2,783	1,266	4,310	1,648	7,466
Tunis.....	0	4,760	0	4,854	0	5,815	0	4,733
Union of South Africa.....	401	4,524	969	7,371	461	5,628	904	3,344
Argentina.....	112	4,020	80	11	82	9,817	22	6,982
Australia <sup>3</sup> .....	0	3,442	0	2,366	0	2,329	0	505
Philippine Islands.....	0	3,051	0	3,178	0	3,600	1,148	3,681
Poland.....	1	1,847	0	1,089	0	1,307	0	950
Yugoslavia.....	0	1,578	0	226	0	5,448	0	3,570
Total.....	37,725	3,996,234	59,235	4,786,439	31,891	5,249,117	18,768	4,982,576

Bureau of Agricultural Economics. Official sources except where otherwise noted. Include shelled and unshelled, assuming the peanuts to be unshelled unless otherwise stated. When shelled nuts were reported they have been reduced to terms of unshelled at the ratio of 3 pounds unshelled to 2 pounds of shelled.

<sup>1</sup> Preliminary.<sup>2</sup> International Yearbook of Agricultural Statistics.<sup>3</sup> 4-year average.TABLE 296.—*Peanuts: Estimated average price per pound, in the shell, received by producers, United States, 1922-23 to 1931-32*

Crop year	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Weighted average
1922-23.....	5.2	5.0	5.9	6.5	6.7	7.1	7.1	7.3	6.9	6.7	6.7	7.0	5.5
1923-24.....	6.3	6.2	6.4	6.7	6.8	6.7	6.4	6.5	6.4	6.6	6.4	6.4	6.5
1924-25.....	6.3	5.6	5.4	5.5	5.9	5.7	6.2	6.2	5.4	5.2	5.7	4.7	5.7
1925-26.....	5.1	4.4	4.5	4.7	4.6	5.1	5.0	4.7	5.3	5.3	5.1	4.9	4.7
1926-27.....	4.6	4.7	4.9	5.4	5.6	5.7	5.9	6.6	6.4	6.4	6.0	4.9	4.8
1927-28.....	4.6	5.2	5.4	5.4	5.4	5.5	5.7	5.6	5.5	5.5	5.0	4.6	5.0
1928-29.....	4.8	5.1	5.0	5.1	5.1	5.2	5.0	5.1	4.9	4.7	4.6	4.4	4.9
1929-30.....	4.0	3.8	3.7	3.5	3.5	3.5	3.7	3.6	3.7	3.8	3.9	4.2	3.8
1930-31.....	3.8	3.2	3.2	3.6	3.7	3.9	4.1	3.9	3.8	3.6	3.1	2.3	3.4
1931-32.....	2.2	2.0											

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by estimated monthly marketings. For previous data see 1930 or earlier year books.

TABLE 297.—*Peanuts: Acreage, yield per acre, production, and December 1 price, by States, 1928-1931*

State	Peanuts gathered															
	Acreage				Yield per acre				Production				Farm price, Dec. 1			
	1928	1929	1930	1931 <sup>1</sup>	1928	1929	1930	1931	1928	1929	1930	1931 <sup>1</sup>	1928	1929	1930	1931
	1,000 acres	1,000 acres	1,000 acres	1,000 acres	Lbs.	Lbs.	Lbs.	Lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	Cts.	Cts.	Cts.	Cts.
Va.	152	153	188	153	828	1,080	720	1,080	141,056	157,590	99,380	154,160	4.7	3.9	3.1	1.9
N. C.	205	230	218	263	1,080	1,020	900	1,150	215,250	235,600	195,200	305,900	4.9	4.0	3.3	2.1
S. C.	10	10	12	14	690	735	700	650	6,900	7,350	8,400	9,100	4.2	3.4	4.0	3.5
Ga.	350	322	333	410	540	650	650	660	189,000	254,800	215,450	270,800	4.4	3.4	3.2	1.5
Fla.	44	58	46	55	575	600	580	580	25,300	34,800	25,780	31,900	4.2	3.5	3.3	2.3
Tenn.	18	18	13	9	800	780	550	700	14,400	12,160	7,150	6,300	4.7	3.3	3.3	2.0
Ala.	225	228	195	273	590	550	600	600	128,000	125,950	117,000	163,800	3.9	3.0	2.8	1.5
Miss.	10	14	13	20	600	640	520	650	6,000	8,960	6,780	13,000	6.5	6.5	6.0	4.0
Ark.	12	14	9	19	720	564	475	580	8,640	7,896	4,275	10,640	6.4	5.0	4.5	4.0
La.	12	10	10	13	450	540	415	600	5,400	5,400	4,150	7,800	6.6	6.5	6.0	5.0
Okla.	47	71	22	27	750	542	460	540	35,250	38,482	10,120	14,880	4.5	3.9	3.0	2.0
Tex.	126	168	124	161	650	420	415	530	81,900	68,460	51,460	85,330	3.8	3.7	3.5	2.0
U. S.	1,211	1,360	1,133	1,419	708	703	659	763	855,096	956,448	747,085	1,083,110	4.44	3.63	3.25	1.88

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.<sup>2</sup> Average of State prices weighted by total production, which includes peanuts grazed or otherwise utilized as well as those gathered.TABLE 298.—*Peanuts: Monthly average prices of cleaned and shelled peanuts, for prompt shipment, f. o. b. important shipping points, 1930-31*VIRGINIA-NORTH CAROLINA SECTION: VIRGINIA, NORTH CAROLINA, AND TENNESSEE<sup>1</sup>

Description	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
Cleaned Virginias:	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.	Cts.
Jumbos.....	7½	8¼	8¼	8¼	8¼	8¼	8	8	8	7½	7½	7½
Fancys.....	5½	6¼	6¼	6¼	6¼	6¼	6¼	6¼	6¼	6¼	5½	5
Extras.....	5	5¼	5¼	5¼	5¼	5¼	5¼	5¼	5¼	5¼	5¼	4
Shelled Virginias:												
Extra large.....	7½	7	7¼	7¼	7¼	7¼	8¼	8¼	8¼	7½	7½	6¼
No. 1.....	6½	6	6¼	6¼	7¼	7½	7½	7½	7½	6½	5½	4½
No. 2.....	5	4½	5¼	5¼	5¼	5¼	5¼	5¼	5¼	5¼	4½	3

SOUTHEAST SECTION: SOUTH CAROLINA, GEORGIA, ALABAMA, AND FLORIDA<sup>1</sup>

Shelled:												
Spanish, No. 1.....	5½	5½	6	6½	6½	6½	6½	6½	6½	5½	4½	2½
Spanish, No. 2.....	4½	4½	5	5½	5½	5½	5½	5½	5½	4½	3½	2½
Runners, No. 1.....	4½	4½	5½	6½	6½	6½	6½	6½	6½	5½	4½	2½
Runners, No. 2.....	4½	4½	4½	5½	5½	5½	5½	5½	5½	5½	4½	2½

SOUTHWEST SECTION: TEXAS, OKLAHOMA, ARKANSAS<sup>1</sup>

Shelled:												
Spanish, No. 1.....	6¼	5½	6¼	7½	7½	7½	7½	7½	8	8½	8½	3½
Spanish, No. 2.....	5½	5¼	5¼	6½	6½	6½	6½	6½	6½	6½	3½	2½

Bureau of Agricultural Economics. Based on returns from cleaners, shellers, and brokers. Crop year extends from November to next October in the Virginia-North Carolina section; farther south it begins earlier.

<sup>1</sup> Important shipping points: Boykins, Franklin, Norfolk, Petersburg, Suffolk, and Zuni, Va.; Ahsokie, Edenton, Elizabethtown, Enfield, Scotland Neck, Tarboro, and Williamston, N. C.<sup>2</sup> Important shipping points: Albany, Americus, Arlington, Ashburn, Bainbridge, Blakely, Cairo, Camilla, Coleman, Cordele, Dawson, Donalsonville, Fort Gaines, Leary, Pelham, Shellman, Tifton, and Valdosta, Ga.; Andalusia, Brundridge, Dothan, Elba, Enterprise, Eufaula, Headland, and Troy, Ala.; Greenwood and Marianna, Fla.<sup>3</sup> Important shipping points: De Leon, Denison, Dublin, and Fort Worth, Tex.; Durant and Hugo, Okla.

TABLE 299.—*Peanut oil, crude and virgin: Peanuts, crushed, and quantity of oil produced in United States, 1919-20 to 1930-31*

Year beginning October	Peanuts crushed <sup>1</sup>					Oil produced				
	Octo- ber-De- cember	Janu- ary- March	April- June	July- Sep- tember	Total	Octo- ber-De- cember	Janu- ary- March	April- June	July- Sep- tember	Total
	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
1919-20.....	4,364	5,867	9,214	15,770	35,215	1,395	1,207	2,311	3,498	8,411
1920-21.....	27,414	27,962	32,623	23,480	111,779	6,069	7,287	8,913	5,958	28,227
1921-22.....	40,338	44,152	25,964	4,708	115,157	11,075	11,381	6,771	1,236	30,433
1922-23.....	13,169	9,081	8,436	941	31,627	3,256	1,700	1,998	255	7,209
1923-24.....	6,164	4,678	5,471	1,928	18,239	1,406	1,122	1,328	438	4,204
1924-25.....	17,668	24,678	16,893	9,096	68,335	3,804	5,265	4,091	1,974	15,134
1925-26.....	17,134	17,880	10,668	4,389	50,071	3,827	4,001	3,093	1,006	11,927
1926-27.....	10,576	11,143	6,321	6,966	35,006	2,544	2,446	1,400	1,600	7,990
1927-28.....	21,810	24,168	8,177	6,661	60,816	5,144	5,324	1,920	1,626	14,014
1928-29.....	14,740	19,596	10,392	11,320	56,048	3,569	4,463	2,331	2,614	12,977
1929-30.....	31,598	50,888	25,606	12,672	120,764	6,723	11,192	6,413	2,751	27,079
1930-31 <sup>2</sup> .....	22,744	23,940	17,950	4,996	60,630	5,139	5,214	4,061	1,134	15,548

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census on "Animal and vegetable fats and oils."

<sup>1</sup> Quantities reported in terms of hulled have been converted to "in the hull" basis by multiplying by 1.5.

<sup>2</sup> Preliminary.

TABLE 300.—*Peanut oil: International trade, average 1925-1929, annual 1927-1930*

Country	Calendar year									
	Average 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports	Ex- ports	Im- ports
<b>PRINCIPAL EXPORTING COUNTRIES</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
France.....	70,810	10,763	62,493	12,728	76,820	13,293	93,704	14,495	75,860	14,512
China.....	70,538	0	78,880	0	44,326	0	41,360	0	110,880	0
Germany.....	58,861	8,040	52,507	5,861	83,763	3,207	113,267	4,008	86,785	3,378
Dutch East Indies.....	4,262	1,676	1,843	1,756	9,976	1,770	7,011	1,961	4,703	2,438
Denmark.....	4,046	1,203	2,743	1,399	5,137	838	8,781	800	9,964	1,846
Total.....	208,517	21,712	198,465	21,744	220,022	19,117	264,132	21,214	288,192	22,174
<b>PRINCIPAL IMPORTING COUNTRIES</b>										
Netherlands.....	31,567	58,871	34,735	61,789	34,865	71,695	35,005	60,840	34,039	34,287
United Kingdom.....	21,326	37,167	9,354	46,411	25,754	35,056	23,993	49,542	6,895	49,820
Algeria.....	364	29,416	261	23,477	190	85,105	575	43,152	1,402	45,122
Canada.....	0	20,992	0	4,811	0	14,187	0	31,037	0	56,856
Italy.....	114	13,388	170	16,589	83	18,053	106	8,318	148	1,211
Belgium.....	4,343	9,717	5,608	6,526	8,532	10,081	2,665	15,976	2,310	22,842
Norway.....	0	7,782	0	7,124	0	7,505	0	7,745	0	4,423
Sweden.....	2,177	7,275	4,299	4,702	2,819	6,729	1,959	10,009	1,692	9,353
United States.....	0	4,427	0	2,847	0	4,749	0	3,231	0	15,665
Tunis.....	0	4,283	0	6,485	0	4,540	0	4,557	0	1,094
Philippine Islands.....	0	4,163	0	5,483	0	3,892	0	4,123	0	3,714
Czechoslovakia.....	886	3,360	81	3,510	280	3,908	1,516	6,443	783	5,649
Finland.....	0	2,867	0	1,976	0	3,004	0	3,674	0	2,774
Morocco.....	0	1,878	0	1,163	0	1,433	0	3,236	0	2,006
Total.....	60,277	205,086	54,498	192,893	67,523	219,882	65,759	251,739	48,169	260,016

Bureau of Agricultural Economics. Official sources except where otherwise noted. Conversions made on the basis of 7.5 pounds to the gallon.

<sup>1</sup> Preliminary.

<sup>2</sup> International Yearbook of Agricultural Statistics.

TABLE 301.—*Peanut oil, refined: Average price per pound, in barrels, New York, 1922-23 to 1931-32*

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1922-23	12.40	12.25	13.03	14.25	16.88	17.38	17.75	17.75	16.56	16.00	16.00	16.00	15.53
1923-24	16.00	16.00	15.59	14.80	14.75	14.75	14.75	14.88	16.25	16.25	15.56	15.19	15.19
1924-25	16.45	16.25	16.25	16.25	16.75	16.75	16.75	16.75	15.20	15.00	15.00	15.00	16.03
1925-26	15.00	15.00	15.00	15.00	15.00	15.50	16.00	16.00	16.00	16.00	16.00	16.00	15.54
1926-27	16.00	16.00	15.50	14.62	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.50	14.61
1927-28	14.50	14.50	14.30	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.73
1928-29	13.50	13.50	13.25	11.00	13.50	13.50	13.50	13.44	13.25	13.25	13.25	13.25	13.10
1929-30	13.25	13.25	13.25	13.25	12.85	12.75	12.75	12.35	11.75	11.75	11.75	11.75	12.56
1930-31	11.38	13.50	13.50	13.50	13.50	13.50	13.50	13.10	12.50	12.50	12.50	12.50	12.90
1931-32	12.50	10.30	10.35	10.38									

Bureau of Agricultural Economics. Compiled from Oil, Paint, and Drug Reporter, average of weekly range. See 1930 Yearbook, p. 817, Table 334, for data for earlier years.

TABLE 302.—*Peas, dry field: Acreage, yield per acre, and production, by States, 1929, 1930, and 1931*

State	Acreage			Yield per acre			Production		
	1929	1930	1931 <sup>1</sup>	1929	1930	1931	1929	1930	1931 <sup>1</sup>
	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>Bushels</i>	<i>Bushels</i>	<i>Bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>
Michigan	27	28	29	13.0	11.0	8.5	351	308	246
Wisconsin	30	30	25	15.5	14.5	10.5	465	435	262
Montana	25	30	33	15.5	17.5	13.5	388	525	446
Idaho	56	64	55	20.0	20.0	19.0	1,120	1,280	1,045
Colorado	49	49	49	12.0	12.0	9.0	588	588	441
United States	187	201	191	15.6	15.6	12.8	2,912	3,136	2,440

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.

TABLE 303.—*Clover seed (red and alsike), sweetclover seed, Lespedeza (Japan clover) seed, and alfalfa seed: Acreage, yield per acre, production, and December 1 price, by States, 1929-1931*

## CLOVER SEED (RED AND ALSIKE)

State	Acreage			Average yield per acre			Production			Price per bushel received by producers Dec. 1		
	1929	1930	1931 <sup>1</sup>	1929	1930	1931	1929	1930	1931 <sup>1</sup>	1929	1930	1931
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Dolla.</i>	<i>Dolla.</i>	<i>Dolla.</i>
N. Y.	9,000	2,700	4,000	1.6	1.9	1.6	16,200	5,100	6,400	14.00	14.00	9.70
Pa.	13,000	8,000	12,000	1.5	1.5	1.7	19,500	12,000	20,400	15.25	15.00	12.50
Ohio	255,000	107,000	160,000	1.3	1.0	1.4	331,500	107,000	224,000	10.20	10.20	7.00
Ind.	282,000	149,000	181,000	1.2	0.9	1.0	314,400	134,100	181,000	9.40	11.80	6.40
Ill.	203,000	162,000	121,000	1.2	1.1	1.2	243,800	178,200	145,200	10.28	12.40	7.20
Mich.	208,000	125,000	81,000	1.5	1.2	1.35	312,000	150,000	100,400	9.50	12.40	6.50
Wis.	216,000	138,500	83,000	1.6	1.4	1.2	345,600	193,900	90,600	9.90	11.40	7.50
Minn.	112,000	96,000	87,000	1.7	2.0	1.1	190,400	192,000	95,700	10.50	11.80	7.00
Iowa	240,000	118,000	78,000	1.2	1.25	1.0	288,800	147,500	78,000	11.00	12.50	8.50
Mo.	90,000	63,000	50,000	1.2	1.2	1.2	108,000	75,600	60,000	9.60	11.75	8.50
N. Dak.	2,000	1,000	1,000	3.0	3.0	1.5	6,000	3,000	1,500	9.60	11.75	8.00
Nebr.	19,000	17,300	13,800	1.6	1.8	1.6	30,400	31,100	22,100	11.00	11.30	8.00
Kans.	11,000	17,000	8,500	1.6	1.6	1.5	17,600	27,200	12,800	9.70	11.00	6.70
Md.	22,000	5,000	(9)	1.4	1.4	---	30,800	7,000	---	14.60	11.40	---
Va.	21,000	5,000	(9)	1.55	3	---	32,600	1,500	---	14.00	11.00	---
Ky.	16,000	3,000	1,000	1.6	1.1	2.0	25,600	3,300	2,000	13.00	14.40	9.70
Tenn.	11,000	3,000	3,000	2.1	2.0	1.5	23,100	6,000	4,500	13.75	14.60	10.50
Idaho	47,000	34,000	30,000	4.2	5.1	4.6	197,400	173,400	138,000	9.20	9.90	6.00
Wyo.	2,500	2,500	2,000	2.3	5.0	1.5	5,800	12,500	3,000	12.00	11.00	6.00
Colo.	2,500	2,000	2,000	6.0	5.0	4.5	15,000	10,000	9,000	11.55	9.90	5.00
Oreg.	18,000	17,000	17,000	3.5	3.1	3.5	63,000	52,700	59,500	9.95	10.80	6.50
U. S.	1,789,000	1,076,000	885,300	1.47	1.42	1.38	2,627,300	1,523,100	1,222,100	10.28	11.78	7.15

<sup>1</sup> Preliminary.

<sup>1</sup> Less than 1,000 acres.

TABLE 303.—*Clover seed (red and alsike), sweetclover seed, Lespedeza (Japan clover) seed, and alfalfa seed: Acreage, yield per acre, production, and December 1 price, by States, 1929-1931—Continued*

## SWEETCLOVER SEED

State	Acreage			Average yield per acre			Production			Price per bushel received by producers Dec. 1		
	1929	1930	1931 <sup>1</sup>	1929	1930	1931	1929	1930	1931 <sup>1</sup>	1929	1930	1931
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
Ohio.....	6,000	4,000	5,000	2.5	2.9	2.4	15,000	11,600	12,000	4.80	4.70	3.50
Ind.....	2,000	2,000	2,000	3.0	3.0	3.0	6,000	6,000	6,000	5.30	4.70	3.80
Ill.....	17,000	14,000	13,000	3.5	3.3	2.6	59,500	46,200	33,800	5.10	4.70	3.70
Wis.....		5,000	1,600		4.5	3.7		22,500	5,900		4.05	3.80
Minn.....	53,000	32,000	41,000	4.5	4.5	5.0	238,500	144,000	205,000	3.30	3.55	2.00
Iowa.....	8,000	10,000	11,000	3.0	3.9	4.2	24,000	39,000	46,200	4.95	4.00	4.10
Mo.....	8,000	2,000	2,000	3.0	3.0	3.0	24,000	6,000	6,000	4.50	4.00	3.60
N. Dak.....	80,500	64,000	70,000	4.6	3.8	3.0	370,300	243,200	210,000	3.55	3.35	2.50
S. Dak.....	60,000	46,000	34,000	4.3	3.7	2.4	258,000	159,100	81,800	3.30	3.10	2.50
Nebr.....	18,000	16,200	13,800	4.3	4.2	4.4	77,400	68,000	60,700	3.10	3.10	3.20
Kans.....	14,000	18,000	19,000	3.9	3.9	3.7	54,600	70,200	70,800	3.40	3.30	2.60
Mont.....	5,000	5,000	2,500	4.0	3.0	2.0	20,000	15,000	5,000	4.80	3.70	3.90
Colo.....	4,000	3,500	3,500	5.0	5.0	5.0	20,000	17,500	17,500	3.55	3.90	3.70
U. S.....	275,500	218,700	218,400	4.24	3.88	3.48	1,167,300	848,300	760,000	3.57	3.49	2.67

## LESPEDeza (JAPAN CLOVER) SEED

N. C.....	13,000	15,000	21,000	4.25	3.5	4.65	55,200	52,500	97,800	3.00	2.90	2.75
Ky.....	4,000	3,000	6,000	4.0	3.0	4.0	16,000	9,000	24,000	2.75	2.75	2.30
Tenn.....	24,000	18,000	24,000	3.6	3.0	4.0	86,400	54,000	96,000	2.75	2.75	2.50
Miss.....	4,500	2,700	3,500	4.0	3.0	4.5	18,000	8,100	15,800	3.35	2.75	2.30
La.....	7,000	3,000	2,000	3.3	1.5	2.5	23,100	4,500	5,000	3.60	3.25	2.65
U. S.....	52,500	41,700	56,500	3.78	3.07	4.22	198,700	128,100	238,400	2.97	2.88	2.57

## ALFALFA SEED

Mich.....	3,000	6,000	12,000	1.4	3.0	3.0	4,200	18,000	36,000	14.60	9.00	9.00
Wis.....	1,200	16,400	18,200	1.5	1.7	1.4	1,800	27,900	25,500	14.05	13.00	11.70
Minn.....	22,000	33,000	33,000	1.5	1.5	1.5	33,000	49,500	49,500	13.95	12.10	9.00
N. Dak.....	28,000	18,200	9,000	2.0	1.5	1.4	52,000	27,300	12,600	16.80	12.40	9.00
S. Dak.....	64,000	51,200	25,600	2.1	1.9	1.6	134,400	97,300	41,000	12.95	11.50	8.50
Nebr.....	25,000	21,000	28,000	2.2	2.2	2.6	55,000	46,200	72,800	11.75	9.55	7.50
Kans.....	34,000	57,800	57,800	2.5	3.2	2.5	85,000	188,000	144,500	11.00	8.45	5.45
Okla.....	13,000	14,500	13,000	3.0	4.0	3.0	39,000	88,000	30,300	10.00	8.25	5.50
Tex.....	3,300	2,600	1,900	3.0	2.8	2.4	9,900	7,300	4,600	9.50	9.60	6.50
Mont.....	60,000	66,000	33,000	2.4	2.6	1.4	144,000	171,600	46,200	11.50	10.10	7.20
Idaho.....	30,000	28,000	21,000	4.0	5.4	4.5	120,000	151,200	94,500	9.20	9.40	6.50
Wyo.....	11,500	11,500	9,800	2.3	3.7	2.0	26,400	42,600	19,800	10.35	10.00	7.00
Colo.....	13,000	21,500	20,000	4.0	3.0	3.0	52,000	64,500	60,000	10.10	8.40	6.50
N. Mex.....	4,000	2,800	3,100	3.2	3.0	3.3	12,800	8,400	10,200	10.00	9.00	4.80
Ariz.....	14,000	14,000	14,000	4.5	5.0	4.0	63,000	70,000	56,000	10.10	9.50	5.00
Utah.....	58,000	35,000	32,000	1.4	1.2	1.8	81,200	42,000	57,600	8.70	9.30	5.25
Oreg.....	3,000	3,000	3,000	3.8	3.0	4.0	11,400	9,000	12,000	12.00	11.20	10.50
Calif.....	16,100	17,400	19,100	3.5	4.0	3.7	56,400	60,600	70,700	10.20	12.00	7.50
U. S.....	401,400	419,900	353,600	2.45	2.73	2.41	982,400	1,145,400	852,600	11.17	9.88	6.51

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary.

TABLE 304.—*Clover seed: Receipts, Chicago, 1922-23 to 1931-*

Crop year	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Total
	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>
1922-23.....	1,358	1,298	1,479	1,214	1,044	629	1,825	845	350	109	8	272	10,426
1923-24.....	641	1,681	1,176	1,039	630	1,641	2,054	1,352	259	41	1	40	10,555
1924-25.....	346	888	2,195	1,801	1,500	1,507	1,574	765	9	27	68	328	11,008
1925-26.....	393	946	2,125	2,608	1,984	2,079	2,888	849	487	28	107	366	14,855
1926-27.....	1,107	3,596	2,133	1,350	1,695	1,857	1,671	546	55			64	14,074
1927-28.....	575	2,285	4,689	1,544	1,557	1,522	1,313	848	268	40	165	168	14,974
1928-29.....	958	3,125	2,751	1,746	790	1,431	1,616	959	68	110	160	56	13,770
1929-30.....	1,225	1,833	2,121	1,269	758	1,204	1,588	1,112	232	102	76	360	16,915
1930-31.....	985	1,513	1,782	705	1,224	1,093	1,896	1,916	230	84	464	471	12,353
1931-32.....	1,150	678	2,022	1,505									

Bureau of Agricultural Economics. Compiled from annual reports of the Chicago Board of Trade.

TABLE 305.—*Alfalfa seed: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32*

Crop year	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weight- ed aver- age <sup>1</sup>
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1922-23.....	7.74	8.00	7.94	8.50	9.45	9.58	9.96	10.56	10.44	10.59	10.57	10.25	9.36
1923-24.....	10.38	9.20	10.75	10.21	10.19	10.43	10.51	11.17	11.41	11.67	11.39	11.33	10.63
1924-25.....	10.99	10.74	10.39	10.16	10.33	10.52	11.05	11.72	12.73	12.00	10.99	11.41	10.62
1925-26.....	9.88	10.51	10.30	10.65	9.87	9.51	9.48	9.82	9.94	9.92	10.22	9.79	9.99
1926-27.....	9.37	9.17	8.04	9.42	9.48	10.12	10.33	10.50	11.04	10.63	10.62	10.17	9.45
1927-28.....	9.62	9.69	9.78	9.45	9.70	9.55	9.74	10.11	10.35	10.52	10.91	10.24	9.87
1928-29.....	10.33	10.25	10.71	11.96	12.09	12.67	13.19	13.84	14.19	14.69	14.91	14.68	11.37
1929-30.....	13.52	12.85	11.68	10.83	11.10	11.15	11.16	11.97	11.97	12.58	12.05	12.10	11.65
1930-31.....	11.91	11.36	10.69	10.18	9.86	9.97	10.20	9.91	9.89	9.70	9.64	9.98	10.55
1931-32.....	9.00	8.35	6.94	6.58	6.97	-----	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly price obtained by weighting monthly prices by monthly marketings.

<sup>1</sup> Straight crop year average until 1924. For previous data see 1930 or earlier Yearbooks.

TABLE 306.—*Clover seed, red: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32*

Crop year	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Weight- ed aver- age
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1922-23.....	8.85	9.66	10.18	10.88	11.16	11.52	11.71	11.48	11.20	10.84	10.94	10.46	10.71
1923-24.....	11.07	12.20	12.18	12.22	12.51	12.67	13.04	13.00	13.07	12.72	12.42	12.09	12.38
1924-25.....	12.15	12.80	13.42	15.31	16.17	16.95	18.19	17.40	16.82	15.48	15.67	14.88	15.35
1925-26.....	13.42	14.42	14.85	15.48	16.04	16.33	17.45	17.88	18.08	17.16	17.17	16.83	15.87
1926-27.....	16.63	17.21	17.85	17.89	19.07	20.18	21.16	22.75	22.45	22.07	20.69	17.94	19.06
1927-28.....	16.78	15.67	15.07	15.33	15.97	16.37	16.90	16.92	17.04	16.89	16.42	15.90	16.11
1928-29.....	16.26	16.49	16.68	16.81	16.98	17.37	17.54	17.66	17.90	17.62	17.17	16.30	16.99
1929-30.....	12.48	10.68	9.75	9.04	9.92	9.95	10.03	10.23	10.20	10.40	10.34	11.01	10.34
1930-31.....	11.65	12.47	12.35	11.76	11.78	11.64	11.54	11.59	11.80	11.84	10.76	10.08	11.79
1931-32.....	7.99	6.73	6.97	7.34	-----	-----	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly prices obtained by weighting monthly prices by average monthly marketings. For previous data see 1930 or earlier Yearbooks.

TABLE 307.—*Timothy seed: Acreage, yield per acre, production, and December 1 price, by States, 1929-1931*

State	Acreage			Average yield per acre			Production			Price per bushel received by producers Dec. 1		
	1929	1930	1931 <sup>1</sup>	1929	1930	1931	1929	1930	1931 <sup>1</sup>	1929	1930	1931
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Bush.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
Pa.....	5,000	4,000	4,000	2.5	2.6	3.1	12,500	10,400	12,400	3.20	3.70	2.80
Ohio.....	26,000	13,000	26,000	3.5	3.2	4.2	101,500	41,600	109,200	2.25	3.20	1.60
Ind.....	9,000	4,000	15,000	3.2	2.2	3.5	28,800	8,800	52,500	2.25	3.20	2.00
Ill.....	54,000	59,000	71,000	3.0	2.9	3.4	162,000	171,100	241,400	2.20	3.10	1.70
Wis.....	10,000	18,000	19,000	3.2	3.8	3.5	32,000	68,400	66,500	2.45	3.10	1.70
Minn.....	40,000	44,000	44,900	4.2	4.2	3.5	168,000	184,800	157,200	2.20	2.80	1.60
Iowa.....	172,000	206,400	217,000	3.6	5.0	4.8	619,200	1,032,000	1,041,600	2.20	2.80	1.60
Mo.....	80,000	72,000	80,000	2.9	2.8	4.4	232,000	201,600	352,000	2.20	2.50	1.60
N. Dak.....	2,900	2,500	2,500	3.0	3.0	2.0	8,700	7,500	5,000	2.20	2.40	1.90
S. Dak.....	4,800	5,300	3,400	2.7	2.6	2.3	13,000	13,800	7,800	1.90	2.40	2.30
U. S.....	406,700	428,200	482,800	3.39	4.06	4.24	1,377,700	1,740,000	2,045,600	2.22	2.82	1.61

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Preliminary

TABLE 308.—*Timothy seed: Receipts, Chicago, 1922-23 to 1931-32*

Crop year	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Total
	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.
1922-23	8,967	9,593	4,577	2,048	1,050	570	1,352	1,697	1,243	398	355	124	31,974
1923-24	5,386	13,397	4,419	1,606	1,329	662	1,298	1,815	1,162	65	815	507	31,981
1924-25	3,698	12,714	4,845	3,736	1,552	2,138	2,038	2,566	1,809	1,240	664	687	37,687
1925-26	5,933	7,599	5,009	2,047	1,651	2,499	1,801	2,316	1,734	1,015	667	672	32,943
1926-27	5,907	7,981	3,368	2,113	1,158	1,588	1,780	2,601	1,481	980	779	516	30,252
1927-28	6,548	7,387	3,741	3,812	961	1,170	1,669	1,826	1,625	1,613	1,039	896	32,287
1928-29	1,552	5,664	3,164	958	921	820	650	802	471	335	311	103	15,549
1929-30	3,519	3,363	2,026	1,915	809	600	920	1,229	926	901	109	168	16,485
1930-31	7,079	8,969	3,451	1,701	825	317	862	1,184	2,227	142			26,787
1931-32	13,668	13,771	6,858	3,037	2,642								

Bureau of Agricultural Economics. Compiled from annual reports of the Chicago Board of Trade.

TABLE 309.—*Timothy seed: Estimated average price per bushel received by producers, United States, 1922-23 to 1931-32*

Crop year	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Weighted average
	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1922-23	2.20	2.28	2.48	2.49	2.69	3.06	2.98	3.00	2.99	2.87	2.92	3.16	2.60
1923-24	2.63	3.01	3.12	3.15	3.19	3.37	3.58	3.60	3.54	3.48	3.44	3.28	3.19
1924-25	3.20	3.12	3.16	2.88	3.03	3.04	3.03	3.15	3.24	3.10	3.05	3.47	3.11
1925-26	3.36	3.21	3.21	3.31	3.41	3.38	3.58	3.51	3.47	3.26	3.41	3.36	3.33
1926-27	2.68	2.55	2.61	2.46	2.58	2.62	2.70	2.69	2.76	2.69	2.76	2.68	2.61
1927-28	2.06	1.96	1.58	1.61	1.73	1.78	1.92	1.86	1.88	1.96	2.08	2.07	1.77
1928-29	1.86	1.91	2.08	2.20	2.20	2.41	2.49	2.62	2.67	2.65	2.56	2.36	2.20
1929-30	1.99	1.88	2.02	2.17	2.25	2.48	2.37	2.51	2.67	2.69	2.65	2.53	2.16
1930-31	2.51	2.62	3.06	3.11	3.09	3.29	3.32	3.58	3.61	3.63	3.16	2.33	3.02
1931-32	1.38	1.43	1.44	1.46	1.54								

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by production to obtain a price for the United States; yearly prices obtained by weighting monthly prices by average monthly marketings. For previous data see 1930 or earlier Yearbooks.

TABLE 310.—*Seeds: Average price per 100 pounds, specified markets, 1922-1931*

Season, Jan- May	Alfalfa, Kansas City	Alsike clover, Chi- cago	Red clover, Chi- cago	Ken- tucky blue- grass, Kansas City	Tim- othy, Chi- cago	Sweet- clover, Minne- apolis	Meadow fescue, Kansas City	Lespe- deza, Louis- ville	German millet, Kansas City	Amber sorgho, Kansas City	Hairy vetch, Balti- more	Sudan grass, Kansas City
	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1922	17.96	18.21	23.50	53.50	6.99	8.53	15.90	17.11	2.03	1.94	12.23	4.29
1923	20.03	16.46	20.93	25.88	7.02	12.41	10.00	18.98	3.76	4.25	16.81	14.28
1924	22.26	15.66	20.87	25.09	7.96	15.28	10.58	20.78	3.80	1.74	10.45	8.22
1925	22.84	28.38	33.97	28.00	6.79	12.34	9.42	19.50	4.98	2.24	8.82	5.68
1926	20.40	27.55	33.67	38.05	7.94	9.65	15.49	15.74	3.10	2.72	12.25	4.31
1927	19.90	37.42	42.54	20.53	5.97	13.65	25.00	8.57	3.25	3.10	15.10	6.68
1928	21.90	27.80	30.65	19.72	4.74	8.55	14.70	17.65	2.45	1.90	9.72	3.62
1929	26.04	34.65	33.63	31.31	6.54	8.50	16.01	20.43	3.44	2.09	9.30	5.80
1930	24.81	19.90	21.35	20.00	8.06	8.00	10.00	14.37	3.45	3.47	9.00	5.40
1931	22.56	22.88	25.04	34.37	10.55	9.22	10.76	14.69	3.69	2.81	8.45	7.38

Bureau of Agricultural Economics. Compiled from weekly reports to the bureau from seedsmen in the various markets. These prices are the average wholesale selling prices for high-quality seed.

TABLE 311.—*Field seeds: Average wholesale price per 100 pounds at specified markets, by months, 1922-1931*

Season, January-May	Alfalfa, common, Kansas City					Alsike clover, Chicago				
	Jan.	Feb.	Mar.	Apr.	May	Jan.	Feb.	Mar.	Apr.	May
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
1922.....	16.90	18.00	18.50	17.90	18.50	18.20	19.25	19.00	17.30	17.30
1923.....	19.50	19.50	19.50	20.65	21.00	16.50	16.50	16.50	16.45	16.35
1924.....	21.60	21.60	22.30	23.00	23.00	15.55	15.45	15.45	15.85	16.00
1925.....	22.00	22.10	23.10	23.50	23.50	21.75	22.35	23.05	24.75	25.00
1926.....	20.00	20.00	20.00	21.00	21.00	26.10	27.25	27.85	28.20	28.40
1927.....	19.50	20.00	20.00	20.00	20.00	36.00	37.95	39.45	38.85	34.85
1928.....	21.50	22.00	22.00	22.00	22.00	38.35	38.10	27.80	27.70	27.10
1929.....	26.00	26.00	26.20	26.00	26.00	34.95	33.90	35.15	35.45	34.15
1930.....	23.55	24.75	25.25	25.25	25.25	20.10	19.90	19.50	20.10	19.90
1931.....	22.90	22.50	22.50	22.50	22.50	23.70	24.00	23.75	23.20	22.75
	Red clover, Chicago					Sweet clover, Minneapolis				
	Jan.	Feb.	Mar.	Apr.	May	Jan.	Feb.	Mar.	Apr.	May
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
1922.....	22.20	24.55	25.45	23.35	21.95	8.00	8.25	8.50	8.90	9.00
1923.....	22.55	22.45	20.60	19.70	19.35	12.40	12.00	12.40	13.00	12.25
1924.....	23.10	21.55	21.10	19.60	19.00	15.00	15.00	15.40	15.90	15.10
1925.....	34.20	36.00	34.30	33.35	32.00	13.00	13.00	12.75	11.95	11.00
1926.....	32.15	36.50	37.00	34.00	34.00	9.00	9.45	9.85	9.95	10.00
1927.....	38.60	42.80	45.00	44.25	42.55	14.35	14.35	14.00	13.10	12.50
1928.....	32.50	30.95	29.95	30.20	29.70	8.75	8.70	8.45	8.45	8.40
1929.....	33.00	33.20	34.40	34.35	33.20	8.50	8.50	8.50	8.50	8.50
1930.....	21.20	21.85	21.00	21.60	21.60	8.00	8.00	8.00	8.00	8.00
1931.....	26.00	26.05	25.45	24.15	23.55	9.50	9.40	9.15	9.05	9.00
	Kentucky bluegrass, Kansas City					Timothy, Chicago				
	Jan.	Feb.	Mar.	Apr.	May	Jan.	Feb.	Mar.	Apr.	May
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
1922.....	50.00	52.50	55.00	55.00	55.00	7.05	7.30	7.30	6.60	6.70
1923.....	25.00	25.00	25.00	26.90	27.50	7.00	7.00	7.05	7.05	7.00
1924.....	25.10	25.35	25.00	25.00	25.00	8.15	8.25	8.10	7.75	7.55
1925.....	28.00	28.00	28.00	28.00	28.00	6.95	6.70	6.50	6.85	6.95
1926.....	40.00	39.25	37.00	37.00	37.00	8.10	8.10	7.95	7.80	7.75
1927.....	20.25	21.00	21.00	20.40	20.00	6.05	6.05	5.85	5.95	5.95
1928.....	19.50	19.50	19.80	20.00	20.00	4.75	4.55	4.35	4.75	5.30
1929.....	31.50	30.75	31.30	31.50	31.50	6.75	6.70	6.62	6.45	6.15
1930.....	20.00	20.00	20.00	20.00	20.00	7.10	7.20	7.30	8.25	10.45
1931.....	34.10	34.25	34.50	34.50	34.50	10.20	10.45	10.45	10.70	10.95

Bureau of Agricultural Economics. Compiled from weekly reports to the bureau from seedsmen in the various markets. These prices are the average wholesale selling price for high-quality seed.

TABLE 312.—*Forage plant seed: Imports into United States, 1921-22 to 1930-31*

Kind of seed	Year beginning July									
	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31
	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.
Alfalfa.....	7,259	8,784	12,818	4,783	4,548	5,134	782	1,146	337	233
Canada bluegrass.....	1,034	836	817	1,150	284	882	1,102	1,228	608	985
Awnless brome grass.....	14				11		( <sup>1</sup> )	5	4	4
Alsike clover.....	7,057	5,506	11,056	10,425	10,989	4,163	7,009	4,798	7,220	94
Crimson clover.....	3,443	2,262	7,745	4,834	5,760	2,385	1,346	3,395	3,099	3,079
Red clover.....	10,391	448	24,729	6,541	19,725	10,816	4,041	7,047	2,154	2,805
White clover.....	16,623	520	1,408	1,227	1,606	975	1,778	2,410	2,278	768
Biennial white sweetclover.....			4,039	3,493	5,879	4,130	3,379	1,464	206	
Biennial yellow sweetclover.....			222	52	502	174	116	29	8	
Clover mixtures.....	57	20	74	13	122	24	41	250	32	15
Grass mixtures.....	43	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )			5	5	1
Meadow fescue.....	1		( <sup>1</sup> )	1	13	16	( <sup>1</sup> )	8	1	
Broomcorn millet.....	1,496	5,360	595	253	456	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )
Football millet.....	302	65	184	243	125		30	108		
Orchard grass.....	2,922	768	603	992	253	260	173	2,377	318	342
Rape.....	4,763	6,334	6,600	4,345	6,788	6,438	6,982	6,681	5,119	
Perennial ryegrass.....	1,868	1,834	1,952	1,385	2,302	1,203	1,083	1,180	937	824
Italian ryegrass.....	828	860	1,034	831	1,683	833	456	300	244	200
Timothy.....	95	32	( <sup>1</sup> )	1	3	45	23	( <sup>1</sup> )	37	
Hairy vetch.....	1,941	1,599	3,215	2,068	3,986	2,124	3,895	4,084	2,483	1,628
Spring vetch.....	345	1,858	1,210	1,266	1,603	992	563	1	821	704

Bureau of Agricultural Economics. Compiled from data of the seed laboratory, Bureau of Plant Industry.

<sup>1</sup> Imports of hairy vetch and sweetclover for all years are based on information furnished by U. S. Customs Service. All other figures represent imports of seed permitted entry under the Federal seed act (formerly designated the seed importation act.)

<sup>2</sup> Less than 500 pounds.

<sup>3</sup> Data not compiled.

# STATISTICS OF BEEF CATTLE, HOGS, SHEEP, HORSES, MULES, AND ASSES

TABLE 313.—All cattle and other cattle: Number on farms and value per head in the United States, 1840, 1860, 1867-1932

Year	Cattle on farms			Year	Cattle on farms		
	All cattle <sup>1</sup>	Other than milk cows			All cattle <sup>1</sup>	Other than milk cows	
		Number <sup>2</sup>	Value per head Jan. 1 <sup>3</sup>			Number <sup>2</sup>	Value per head Jan. 1 <sup>4</sup>
	Thousands	Thousands	Dollars		Thousands	Thousands	Dollars
1940 <sup>5</sup>	14, 978			1900 <sup>6</sup>	43, 902	27, 610	
1850 <sup>6</sup>	16, 078	9, 693		1900 <sup>6</sup>	67, 760	50, 584	
1860 <sup>6</sup>	23, 365	14, 779		1900 <sup>6</sup>	57, 518	42, 265	23. 60
1867	20, 080	11, 731	15. 79	1901	60, 544	45, 023	18. 83
1868	20, 634	11, 942	15. 06	1902	62, 215	46, 428	17. 73
1869	21, 433	12, 185	18. 73	1903	63, 788	47, 715	17. 44
1870 <sup>6</sup>	22, 501	13, 568		1904	64, 137	47, 678	15. 42
1870	25, 484	15, 388	18. 87	1905	64, 003	47, 161	14. 32
1871	26, 235	16, 212	20. 78	1906	62, 872	45, 595	14. 98
1872	26, 694	16, 390	18. 12	1907	62, 373	44, 723	16. 16
1873	26, 990	16, 414	18. 06	1908	60, 794	42, 857	15. 96
1874	26, 923	16, 218	17. 55	1909	59, 634	41, 480	16. 53
1875	27, 220	16, 313	16. 91	1910 <sup>6</sup>	61, 808	41, 178	
1876	27, 870	16, 785	17. 00	1910	57, 940	39, 734	18. 02
1877	29, 217	17, 956	15. 99	1911	56, 219	37, 975	19. 41
1878	30, 523	19, 228	16. 72	1912	55, 022	36, 710	20. 03
1879	33, 234	21, 408	15. 38	1913	55, 833	37, 307	24. 91
1880 <sup>6</sup>	34, 038	22, 489		1914	58, 737	39, 807	29. 42
1880	33, 288	21, 321	16. 10	1915	62, 532	43, 006	31. 54
1881	33, 308	20, 939	17. 33	1916	66, 394	46, 330	31. 69
1882	35, 892	23, 280	19. 89	1917	69, 533	48, 992	33. 91
1883	41, 172	28, 046	21. 81	1918	71, 229	50, 208	38. 63
1884	42, 647	29, 046	23. 52	1919	70, 261	49, 042	41. 79
1885	43, 772	29, 867	23. 25	1920 <sup>6</sup>	69, 639	46, 854	
1886	45, 510	31, 275	21. 17	1920	70, 325	48, 870	40. 01
1887	48, 084	33, 512	19. 79	1921	68, 633	47, 193	29. 05
1888	49, 234	34, 378	17. 79	1922	68, 668	46, 841	31. 89
1889	50, 331	35, 032	17. 05	1923	67, 384	45, 285	23. 41
1890 <sup>6</sup>	50, 249	35, 754		1924	65, 832	43, 544	23. 03
1890	52, 802	36, 849	15. 21	1925 <sup>6</sup>	60, 760	42, 115	
1891	52, 896	36, 876	14. 76	1925	63, 115	40, 610	22. 57
1892	54, 067	37, 651	15. 16	1926	59, 977	37, 666	26. 40
1893	52, 378	35, 964	15. 24	1927	57, 528	35, 369	28. 12
1894	53, 095	36, 608	14. 66	1928	56, 701	34, 572	36. 30
1895	50, 869	34, 364	14. 06	1929	57, 878	35, 548	42. 93
1896	48, 223	32, 085	15. 86	1930 <sup>6</sup>	63, 911	43, 415	
1897	46, 450	30, 508	16. 65	1930	59, 730	36, 820	40. 44
1898	45, 105	29, 264	20. 92	1931	60, 915	37, 357	28. 08
1899	43, 984	27, 994	22. 79	1932 <sup>7</sup>	62, 407	38, 028	18. 31

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revisions for the year 1920-1931 were made January, 1932.

<sup>1</sup> Prior to 1900 estimates for each 10-year period represent an index of annual changes applied to census as base on first report after census data were available. Figures for 1900-1919 are tentative revised estimates of the Bureau of Agricultural Economics as first published in 1927 yearbook.

<sup>2</sup> Obtained by subtracting the estimates of "milk cows on farms" shown in Table 386 from the estimates of "all cattle on farms" shown in this table.

<sup>3</sup> Series for 1867-1899 are estimates as currently reported.

<sup>4</sup> Data for 1900-1925 are an old series adjusted on basis average relationship between the old and new series from 1926 to 1928. Old series was weighted averages of prices by age groups only and was shown in 1928 Yearbook. The conversion factor was 0.9466 (base is old series). Data for 1926-1932 are a new series referred to above, of average values by age and sex classification weighted by numbers in each class.

<sup>5</sup> Italic figures for Census years represent classification of cattle as follows: 1840 reported as "neat cattle," 1880 and 1890 exclude an estimated number of unenumerated cattle on ranges as follows: 1880, 3,750,022; 1890, 6,285,220. No estimate made prior to 1880. Figures for census prior to 1900 were nominally exclusive of calves, though some calves may have been included. 1900, 1910, and 1930 include spring born calves. 1850-1890 exclude working oxen as follows: 1850, 1,700,744; 1860, 2,254,911; 1870, 1,319,371; 1880, 993,841; 1890, 1,117,494. Not separately reported after 1890. Census dates were June 1, from 1840 to 1900; Apr. 15, 1910; Jan. 1, 1920 and 1925; Apr. 1, 1930.

<sup>6</sup> Original estimate of the Bureau of Agricultural Economics.

<sup>7</sup> Preliminary.

TABLE 314.—All cattle and calves, including cows and heifers kept for milk: Estimated number on farms and value per head, by States, January 1, 1928-1932

State and division	Number					Value per head <sup>1</sup>				
	1928 <sup>2</sup>	1929 <sup>2</sup>	1930 <sup>2</sup>	1931 <sup>2</sup>	1932 <sup>2</sup>	1928	1929	1930	1931	1932
	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Dol- lars	Dol- lars	Dol- lars	Dol- lars	Dol- lars
Maine.....	225	225	232	241	243	57.90	65.40	71.70	51.20	37.20
New Hampshire.....	116	118	120	127	131	79.30	86.70	89.70	67.90	45.00
Vermont.....	404	409	415	427	436	76.70	77.30	78.70	61.30	41.00
Massachusetts.....	179	181	183	181	179	102.80	106.10	113.40	98.20	70.30
Rhode Island.....	27	28	29	29	29	100.30	114.50	121.00	98.60	71.20
Connecticut.....	140	142	147	153	155	109.90	111.20	113.70	88.10	67.30
New York.....	1,851	1,904	1,956	1,956	1,976	90.60	100.10	95.40	69.20	40.70
New Jersey.....	155	157	160	160	163	102.40	113.80	128.30	104.00	73.50
Pennsylvania.....	1,277	1,330	1,385	1,357	1,398	77.10	86.70	86.20	63.50	47.20
North Atlantic.....	4,874	4,492	4,627	4,631	4,710	85.04	93.13	92.38	68.96	49.70
Ohio.....	1,495	1,525	1,610	1,562	1,610	65.10	72.00	71.90	46.80	34.60
Indiana.....	1,257	1,307	1,333	1,380	1,428	69.00	67.00	66.00	42.50	30.40
Illinois.....	2,053	2,094	2,199	2,265	2,401	59.30	68.70	67.60	48.30	31.70
Michigan.....	1,313	1,335	1,391	1,376	1,390	66.50	70.00	75.10	47.70	34.80
Wisconsin.....	2,920	2,913	3,050	3,150	3,184	69.90	70.10	78.40	51.80	34.60
North Central, East.....	9,068	9,174	9,580	9,713	10,013	64.67	73.37	72.62	48.30	33.34
Minnesota.....	2,750	2,872	3,030	3,151	3,246	54.50	63.30	60.80	41.70	25.60
Iowa.....	3,758	3,858	3,983	4,063	4,185	54.30	61.90	61.30	42.40	26.60
Missouri.....	2,250	2,350	2,500	2,551	2,660	47.60	57.80	53.50	34.70	23.80
North Dakota.....	1,140	1,105	1,307	1,308	1,454	43.60	53.50	51.30	34.90	22.60
South Dakota.....	1,718	1,758	1,871	1,948	1,907	47.80	55.40	54.80	37.30	21.00
Nebraska.....	2,706	2,931	3,016	3,167	3,104	49.40	59.00	55.00	39.00	24.20
Kansas.....	2,670	2,854	2,991	3,141	3,392	44.20	52.40	50.20	33.40	22.00
North Central, West.....	17,052	17,818	18,698	19,417	19,948	49.70	58.38	56.03	38.20	24.17
North Central.....	26,120	26,992	28,247	29,130	29,961	54.90	63.48	61.65	41.57	27.24
Delaware.....	49	50	50	49	49	77.00	93.70	89.00	65.30	40.20
Maryland.....	206	273	277	277	277	69.00	79.50	80.70	61.10	41.20
Virginia.....	723	752	777	754	782	47.10	54.90	54.80	33.90	27.80
West Virginia.....	455	478	510	500	525	52.00	60.30	58.10	36.00	28.60
North Carolina.....	496	496	507	532	548	44.70	48.10	47.80	35.90	27.10
South Carolina.....	295	298	261	261	266	34.10	39.30	39.70	33.10	23.60
Georgia.....	709	736	758	773	789	27.00	31.00	31.60	28.90	16.60
Florida.....	488	444	432	432	441	17.00	23.40	29.70	28.70	18.00
South Atlantic.....	3,531	3,407	3,572	3,578	3,677	40.03	46.92	47.71	33.87	25.18
Kentucky.....	990	1,015	990	940	978	46.90	51.40	49.40	31.80	23.70
Tennessee.....	957	971	992	962	1,032	38.80	43.60	44.40	28.80	20.60
Alabama.....	756	756	756	771	810	27.80	32.20	33.10	22.40	15.80
Mississippi.....	879	863	902	929	990	25.80	30.10	32.40	20.30	14.30
Arkansas.....	737	728	743	773	848	29.90	34.10	33.90	19.20	16.20
Louisiana.....	655	684	694	705	740	23.70	31.90	30.70	22.70	18.20
Oklahoma.....	1,729	1,814	1,915	2,010	2,151	39.70	45.00	41.00	26.40	18.70
Texas.....	5,950	6,162	6,262	6,127	6,127	37.30	41.70	37.60	23.90	17.30
South Central.....	12,653	12,983	13,234	13,217	13,652	35.99	40.79	38.27	24.38	17.90
Montana.....	1,141	1,190	1,226	1,263	1,250	48.00	58.10	53.80	38.80	24.10
Idaho.....	588	598	606	636	668	48.60	56.70	52.60	40.70	24.60
Wyoming.....	771	778	790	830	863	48.90	59.10	54.30	40.30	24.50
Colorado.....	1,377	1,421	1,454	1,541	1,541	46.70	55.30	50.90	37.80	22.50
New Mexico.....	1,156	1,073	1,100	1,100	1,144	38.90	46.50	40.30	30.30	21.30
Arizona.....	635	715	750	795	851	40.90	49.50	48.00	33.20	22.30
Utah.....	475	475	461	475	484	45.00	57.50	52.70	40.30	22.70
Nevada.....	375	345	320	320	310	46.40	59.90	52.40	38.70	25.70
Washington.....	530	557	579	591	615	58.20	72.40	65.80	47.90	37.00
Oregon.....	702	723	757	772	795	49.50	59.90	54.70	40.70	29.80
California.....	2,070	2,049	1,967	2,006	1,886	53.70	64.50	63.00	51.50	33.90
Western.....	10,023	9,914	10,010	10,329	10,407	47.70	58.11	53.72	40.76	26.43
United States.....	56,701	57,878	59,730	60,915	62,407	50.81	58.77	56.09	39.31	26.64

Bureau of Agricultural Economics. Estimates of crop-reporting board. Revisions by States, 1920-1927, are published in February, 1932, Crops and Markets.

<sup>1</sup> Sum of total value of subgroups (classified by age and sex) divided by total number and rounded to nearest dime for States. Division and United States averages not rounded. State figures are new weighted value series not comparable to State figures previously published for the years prior to 1925.

<sup>2</sup> Revised, January, 1932.

<sup>3</sup> Preliminary.

TABLE 315.—Cattle: Number in countries having 150,000 or over, average 1921-1925, annual 1926-1931

Country	Month of estimate	Average 1921-1925 <sup>1</sup>	1926	1927	1928	1929	1930	1931
North America and West Indies:		Thous-	Thous-	Thous-	Thous-	Thous-	Thous-	Thous-
United States.....	January.....	66,725	59,977	57,528	56,701	57,878	59,730	60,915
Canada.....	June.....	9,588	8,571	9,172	8,793	8,826	8,937	.....
Mexico.....	do.....	<sup>2</sup> 2,492	5,585	.....	.....	.....	.....	.....
Guatemala.....	July.....	268	564	310	298	396	416	.....
Honduras.....	.....	<sup>3</sup> 466	.....	.....	.....	.....	.....	.....
Salvador.....	.....	.....	.....	.....	.....	.....	<sup>4</sup> 328	.....
Nicaragua.....	.....	<sup>5</sup> 1,200	.....	.....	.....	.....	.....	.....
Costa Rica.....	.....	435	423	478	443	399	.....	.....
Cuba.....	December <sup>6</sup> .....	4,841	3,783	4,704	4,729	4,421	4,845	4,377
Dominican Republic.....	May.....	640	.....	.....	488	.....	.....	.....
Porto Rico.....	.....	279	.....	.....	141	.....	.....	.....
Estimated total <sup>7</sup> .....	.....	87,900	.....	.....	.....	.....	.....	.....
South America:		.....	.....	.....	.....	.....	.....	.....
Colombia.....	.....	7,468	6,500	6,727	.....	.....	7,343	.....
Venezuela.....	.....	2,689	.....	.....	.....	.....	<sup>8</sup> 3,000	.....
British Guiana.....	.....	117	138	141	154	154	154	.....
Ecuador.....	.....	<sup>9</sup> 1,500	1,280	.....	.....	<sup>8</sup> 1,285	.....	.....
Peru.....	February.....	1,198	.....	.....	.....	.....	<sup>4</sup> 1,806	.....
Bolivia.....	.....	2,145	2,320	1,404	.....	1,855	.....	.....
Chile.....	.....	1,957	.....	.....	.....	.....	<sup>4</sup> 2,388	.....
Brazil <sup>5</sup> .....	September.....	<sup>10</sup> 34,271	.....	.....	.....	.....	<sup>10</sup> 40,000	.....
Uruguay.....	December <sup>6</sup> .....	<sup>4</sup> 8,432	.....	.....	.....	.....	<sup>4</sup> 7,128	.....
Paraguay.....	do.....	4,600	.....	.....	.....	.....	.....	.....
Argentina.....	.....	<sup>4</sup> 37,065	.....	.....	.....	.....	<sup>10</sup> 32,212	.....
Estimated total <sup>7</sup> .....	.....	101,500	.....	.....	.....	.....	.....	.....
Europe:		.....	.....	.....	.....	.....	.....	.....
England and Wales.....	June.....	5,824	6,253	6,275	6,026	5,958	5,850	6,064
Isle of Man.....	do.....	19	19	19	19	20	20	.....
Scotland.....	do.....	1,171	1,198	1,210	1,214	1,233	1,233	1,208
Northern Ireland.....	do.....	748	667	697	738	700	673	680
Irish Free State.....	do.....	4,266	3,947	4,047	4,125	4,137	4,038	4,029
Norway <sup>11</sup> .....	do.....	1,128	1,200	1,209	1,221	1,224	1,251	1,310
Sweden.....	do.....	2,418	<sup>4</sup> 2,898	<sup>4</sup> 2,898	.....	.....	3,060	.....
Denmark.....	July.....	2,613	2,838	2,913	3,016	3,036	3,057	3,197
Netherlands.....	(May-June) <sup>4</sup> .....	2,063	.....	.....	.....	.....	<sup>4</sup> 2,306	.....
Belgium.....	December <sup>6</sup> .....	1,550	1,655	1,712	1,739	1,751	1,738	1,759
France.....	do.....	13,582	14,373	14,482	14,941	15,005	15,631	15,467
Spain.....	do.....	3,457	3,794	3,688	.....	<sup>4</sup> 3,660	.....	.....
Portugal.....	.....	754	.....	.....	.....	.....	.....	.....
Italy <sup>8</sup> .....	(March-April) <sup>4</sup> .....	6,812	<sup>8</sup> 7,400	.....	.....	.....	<sup>4</sup> 6,902	.....
Switzerland.....	April <sup>4</sup> .....	1,425	<sup>4</sup> 1,587	.....	.....	.....	<sup>4</sup> 1,609	.....
Germany.....	December <sup>6</sup> .....	16,786	17,202	17,221	18,011	18,414	18,033	18,431
Austria.....	(December-April) <sup>4</sup> .....	2,241	.....	.....	.....	.....	<sup>4</sup> 2,313	.....
Czechoslovakia.....	December <sup>6</sup> .....	4,337	4,690	.....	.....	.....	.....	4,458
Hungary.....	April.....	1,866	1,847	1,805	1,812	1,819	1,785	1,814
Yugoslavia <sup>9</sup> .....	January.....	4,122	3,738	3,760	3,686	3,705	3,850	.....
Greece <sup>1</sup> .....	December <sup>6</sup> .....	742	890	964	947	955	874	.....
Bulgaria <sup>1</sup> .....	do.....	1,928	.....	2,260	.....	.....	.....	.....
Rumania <sup>8</sup> .....	do.....	5,570	5,219	4,992	4,537	4,442	4,355	4,011
Poland.....	November.....	8,063	.....	8,602	.....	9,037	9,400	9,782
Lithuania.....	.....	1,149	1,396	1,128	1,199	1,180	1,170	.....
Latvia.....	June.....	867	955	997	961	<sup>9</sup> 978	1,026	1,117
Estonia.....	July.....	508	599	634	651	604	627	.....
Finland.....	September.....	1,847	1,860	1,872	1,917	1,903	.....	.....
Russia, European and Asiatic <sup>12</sup> .....	Summer.....	58,263	63,025	68,158	70,700	67,200	53,800	.....
Estimated total excluding Russia <sup>7</sup> .....	.....	98,000	.....	.....	.....	.....	.....	.....
Africa:		.....	.....	.....	.....	.....	.....	.....
Abyssinia (Ethiopia).....	.....	(4,000)	.....	.....	4,000	.....	.....	.....
Morocco.....	.....	1,711	1,933	1,865	1,814	2,151	2,092	.....
Algeria.....	September.....	853	946	849	887	897	939	.....
Tunis.....	December <sup>6</sup> .....	459	370	468	501	484	498	.....
French West Africa.....	.....	2,165	2,329	2,402	2,529	<sup>4</sup> 2,844	2,825	.....
French Sudan.....	.....	1,086	910	1,030	908	<sup>4</sup> 1,139	1,100	.....
Nigeria, including British Cameroons.....	.....	2,909	3,162	2,997	3,095	3,083	2,973	.....
Egypt <sup>3</sup> .....	September.....	1,310	1,485	1,497	1,580	1,623	1,572	.....
Anglo-Egyptian Sudan.....	.....	864	1,500	1,501	1,503	1,505	1,300	.....
Italian Somaliland.....	February.....	<sup>4</sup> 1,246	.....	.....	<sup>4</sup> 1,106	1,112	1,113	.....
Eritrea.....	.....	553	.....	748	<sup>4</sup> 799	.....	.....	.....
Kenya Colony.....	March-June.....	3,038	3,418	3,476	3,482	3,498	5,193	.....
Uganda.....	December <sup>6</sup> .....	1,109	1,342	1,338	1,738	1,710	1,911	.....
French Equatorial Africa.....	.....	315	881	.....	.....	.....	.....	.....
Belgian Congo.....	.....	495	465	495	485	256	197	.....

See footnotes at end of table.

**TABLE 315.—Cattle: Number in countries having 150,000 or over, average 1921–1925, annual 1926–1931—Continued**

Country	Month of estimate	Average 1921–1925 <sup>1</sup>	1926	1927	1928	1929	1930	1931
		Thou-sands	Thou-sands	Thou-sands	Thou-sands	Thou-sands	Thou-sands	Thou-sands
<b>Africa—Continued.</b>								
Ruanda-Urundi.....		700	750	771	800	820	1,000	-----
Angola-Portuguese West Africa.....		524	742	1,053	1,074	1,423	-----	-----
Mozambique (Portuguese East Africa).....		342	380	412	402	479	491	-----
British Southwest Africa.....		561	621	585	655	698	655	-----
Bechuanaland.....		432	518	598	625	-----	-----	-----
Union of South Africa.....	April-May	9,459	10,514	10,590	10,650 <sup>13</sup>	10,695	-----	-----
Basutoland.....		604	645	659	650	664	649	-----
Rhodesia—								
Northern.....	December <sup>4</sup>	289	382	363	416	441	473	-----
Southern.....	do.	1,794	2,102	2,189	2,327	2,326	2,408	-----
Swaziland.....	do.	244	185	300	350	367	380	-----
Tanganyika Territory.....		3,806	4,479	4,706	4,895	4,867	5,170	-----
Madagascar.....	February	7,708	-----	7,362	6,901	6,841	7,048	-----
Estimated total <sup>7</sup> .....		50,000	-----	-----	-----	-----	-----	-----
<b>Asia:</b>								
Turkey, European and Asiatic <sup>8</sup> .....		4,821	5,572	5,772	5,559	5,215	5,343	-----
Persia.....		<sup>9</sup> 1,000	-----	-----	-----	-----	-----	-----
Syria and Lebanon.....		257	243	312	318	332	391	-----
India— <sup>10</sup>								
British.....	December-April	146,750	150,832	151,288	151,146	151,330	154,629	-----
Native States.....	do.	33,982	33,276	34,643	33,409	33,671	<sup>11</sup> 43,207	-----
Ceylon <sup>12</sup> .....	December <sup>4</sup>	1,450	1,457	1,537	1,588	1,018	1,650	-----
China, including Turkestan and Manchuria.....		22,000	-----	-----	-----	-----	-----	-----
Japan.....	December <sup>4</sup>	1,440	1,460	1,465	1,474	1,484	1,488	-----
Chosen <sup>13</sup> .....	do.	1,567	1,501	1,595	1,586	1,570	1,586	1,612
Taiwan.....	do.	407	379	381	386	388	390	-----
French Indo-China <sup>14</sup> .....		3,474 <sup>14</sup>	3,960 <sup>14</sup>	3,778 <sup>14</sup>	3,896 <sup>14</sup>	<sup>14</sup> 3,926	3,700	-----
Siam <sup>15</sup> .....	March	6,701	8,230	8,495	8,657	9,379	9,153	-----
Philippine Islands <sup>16</sup> .....	December <sup>4</sup>	2,393	2,622	2,840	2,968	3,064	-----	-----
Dutch East Indies—								
Java and Madura <sup>17</sup> .....	do.	5,287	5,721	5,680	5,781	5,658	5,700	5,768
Outer Possessions <sup>18</sup> .....	do.	1,872	1,965	1,952	1,981	2,022	2,049	2,064
Estimated total, excluding Russia <sup>7</sup> .....		235,200	-----	-----	-----	-----	-----	-----
<b>Oceania:</b>								
Australia.....	December <sup>4</sup>	13,789	13,280	11,963	11,617	11,301	11,202	-----
New Zealand.....	January	3,393	3,452	3,258	3,274	3,446	3,766	-----
Estimated total <sup>7</sup> .....		17,400	-----	-----	-----	-----	-----	-----
<b>Total countries reporting all periods, including Russia—</b>								
To 1930 (55) <sup>19</sup> .....		447,738	455,142	460,310	462,277	461,511	465,383	-----
To 1931 (17) <sup>19 16</sup> .....		136,263	130,391	128,989	129,119	130,246	132,580	133,823
Estimated world total, including Russia <sup>7</sup> .....		648,300	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Compiled from official sources and the International Institute of Agriculture unless otherwise stated. Figures in parenthesis interpolated.

<sup>1</sup> Average for 5-year period if available; otherwise, for any year or years within this period except as otherwise stated.

<sup>2</sup> Incomplete.

<sup>3</sup> Year 1918.

<sup>4</sup> Census.

<sup>5</sup> Unofficial.

<sup>6</sup> Countries reporting as of December have been considered as of Jan. 1 of the following year; i. e., figures for number of cattle in France as of Dec. 31, 1925, have been put in the 1926 column, etc.

<sup>7</sup> This total includes interpolations for a few countries not reporting each year and rough estimates for some others.

<sup>8</sup> Buffaloes included.

<sup>9</sup> Year 1920.

<sup>10</sup> June, 1930.

<sup>11</sup> In rural communities only.

<sup>12</sup> Years 1924–1926, from Statistical Review, October, 1928, p. 6; year 1927, Agricultural Statistics of the U. S. S. R., Lenin Academy, 1927–1930—Planned Economy No. 12, 1930, State Planning Board.

<sup>13</sup> Number in towns assumed to be same as in 1927; i. e., 177,000 and added in for purposes of comparison with preceding years.

<sup>14</sup> Including 1925 estimate of 1,324,500 cattle and buffaloes in order to compare with preceding estimates.

<sup>15</sup> Comparable totals for number of countries indicated.

<sup>16</sup> Excluding Russia as figures are not available for 1931.

TABLE 316.—*Cattle and calves: Receipts and stocker and feeder shipments at all public stockyards, 1922-1931*

## RECEIPTS, CATTLE

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>
1922----	sands	sands	sands	sands	sands	sands	sands	sands	sands	sands	sands	sands	sands
1922----	1,222	1,044	1,145	1,009	1,358	1,217	1,255	1,608	1,802	2,243	1,846	1,392	17,141
1923----	1,895	1,038	1,044	1,159	1,305	1,138	1,357	1,622	1,782	2,141	1,650	1,368	16,999
1924----	1,898	1,041	1,084	1,161	1,317	1,172	1,254	1,398	1,938	2,096	1,796	1,528	17,173
1925----	1,353	1,056	1,273	1,201	1,139	1,160	1,399	1,632	1,592	2,126	1,717	1,470	17,117
1926----	1,814	1,065	1,233	1,146	1,277	1,279	1,421	1,827	2,030	2,030	1,836	1,327	17,034
1927----	1,827	1,080	1,172	1,107	1,348	1,185	1,089	1,494	1,482	2,008	1,749	1,217	16,258
1928----	1,772	1,045	966	1,119	1,188	1,067	1,158	1,308	1,669	1,913	1,419	1,075	15,189
1929----	1,160	814	953	1,146	1,097	977	1,166	1,156	1,572	1,787	1,405	1,104	14,337
1930----	1,155	903	1,045	1,068	984	996	1,012	1,062	1,172	1,677	1,180	1,202	13,799
1931----	1,040	878	1,017	1,057	1,027	1,017	1,035	1,302	1,279	1,531	1,312	991	13,486

## RECEIPTS, CALVES

1922----	406	372	477	461	520	542	456	541	595	693	581	433	6,077
1923----	482	389	458	511	595	492	546	592	512	661	532	442	6,212
1924----	500	415	472	590	574	502	544	536	628	640	567	555	6,523
1925----	516	473	588	626	597	586	572	612	566	663	565	586	6,950
1926----	526	486	578	564	616	592	511	576	570	644	625	519	6,537
1927----	504	476	571	567	607	547	457	571	507	627	598	473	6,505
1928----	499	471	499	566	610	501	492	521	522	629	544	435	6,289
1929----	479	381	497	606	553	475	499	463	581	620	538	451	6,103
1930----	484	418	502	578	533	464	499	543	596	700	517	531	6,368
1931----	488	425	518	560	524	522	453	519	518	606	554	462	6,129

## STOCKER AND FEEDER SHIPMENTS, CATTLE

1922----	223	234	266	223	338	243	216	453	595	792	630	331	4,544
1923----	262	199	186	221	288	220	212	459	608	734	577	338	4,301
1924----	231	165	167	230	267	191	161	293	556	724	497	288	3,770
1925----	194	163	213	254	198	143	224	347	409	681	449	308	3,593
1926----	207	164	171	190	201	158	188	240	495	645	521	273	3,456
1927----	187	162	182	184	215	157	128	252	384	626	548	278	3,303
1928----	215	175	154	226	263	165	175	312	525	704	420	218	3,562
1929----	159	106	146	266	266	157	159	246	394	673	459	219	3,250
1930----	201	173	176	219	172	108	99	180	368	570	375	267	2,858
1931----	199	130	126	156	135	100	108	231	340	495	384	207	2,601

## STOCKER AND FEEDER SHIPMENTS, CALVES

1922----	10	9	16	11	21	17	7	16	35	72	80	26	320
1923----	19	12	13	11	12	14	11	21	23	51	47	15	249
1924----	11	5	8	9	8	10	9	13	24	39	51	21	203
1925----	12	13	17	17	18	11	9	13	18	37	40	25	230
1926----	18	13	13	13	17	11	11	12	26	45	49	28	256
1927----	18	13	18	19	20	12	10	19	22	49	67	41	306
1928----	18	19	19	18	21	19	21	24	37	94	76	35	403
1929----	19	12	16	26	23	19	14	20	20	85	97	67	401
1930----	32	26	30	36	23	21	10	20	75	121	103	64	503
1931----	33	18	20	19	18	12	16	30	41	86	103	38	434

Bureau of Agricultural Economics. Compiled from data of the livestock and meat reporting service of the bureau. Earlier data in 1930 Yearbook, p. 829, Table 353.

TABLE 317.—*Cattle and calves: Receipts at principal public stockyards and at all public stockyards, 1922-1931*

CATTLE												
Year	Chi- cago	Den- ver	East St. Louis	Fort Worth	Kan- sas City	Omaha	St. Joseph	South St. Paul	Sioux City	Total 9 mar- kets <sup>1</sup>	All other stock- yards report- ing	Total all stock- yards report- ing <sup>1</sup>
	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands
1922.....	3,163	587	1,026	760	2,443	1,612	554	930	691	11,766	5,375	17,141
1923.....	3,157	561	1,041	947	2,632	1,685	608	839	714	12,183	4,816	16,999
1924.....	3,203	572	1,034	1,049	2,471	1,759	602	790	798	12,278	4,895	17,173
1925.....	3,023	527	1,038	1,060	2,409	1,593	609	995	845	12,098	5,019	17,117
1926.....	3,257	473	1,074	944	2,183	1,692	563	1,160	885	12,251	4,783	17,034
1927.....	2,872	577	1,004	956	2,070	1,468	541	955	747	11,186	5,072	16,258
1928.....	2,505	590	900	886	1,859	1,423	511	917	750	10,842	4,847	15,689
1929.....	2,388	556	832	762	1,836	1,444	500	879	778	9,974	4,363	14,337
1930.....	2,239	505	820	638	1,802	1,485	459	779	774	9,501	4,298	13,799
1931.....	2,287	440	792	598	1,665	1,570	433	811	769	9,364	4,122	13,486

## CALVES

Year	Chi- cago	Den- ver	East St. Louis	Fort Worth	Kan- sas City	Omaha	St. Joseph	South St. Paul	Sioux City	Total 9 mar- kets <sup>1</sup>	All other stock- yards report- ing	Total all stock- yards report- ing <sup>1</sup>
	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands
1922.....	771	70	375	324	540	132	100	457	56	2,825	3,252	6,077
1923.....	761	59	358	311	576	108	101	510	45	2,829	3,383	6,212
1924.....	794	59	350	343	572	104	117	534	38	2,910	3,613	6,523
1925.....	948	60	406	310	749	116	125	641	52	3,108	3,842	6,950
1926.....	765	56	452	241	433	123	116	730	84	2,901	3,846	6,747
1927.....	710	63	444	330	400	98	99	627	62	2,834	3,671	6,505
1928.....	762	77	415	325	351	94	87	573	63	2,746	3,543	6,289
1929.....	672	68	391	327	342	102	89	546	61	2,601	3,502	6,103
1930.....	557	88	383	331	304	120	100	559	52	2,586	3,782	6,368
1931.....	547	64	379	213	292	120	76	603	82	2,406	3,723	6,129

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-reporting service of the bureau. Receipts, 1900-1921, are available in 1924 Yearbook, p. 840, Table 435.

<sup>1</sup> Rounded totals of the complete figures.

TABLE 318.—*Beef cattle and veal calves: Estimated average price per 100 pounds received by producers in the United States, 1922-1931*

BEEF CATTLE													
Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weight- ed aver- age
	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1922	4.75	5.07	5.46	5.53	5.70	5.84	5.76	5.51	5.44	5.48	5.29	5.28	5.43
1923	5.51	5.55	5.62	5.78	5.77	5.82	5.72	5.60	5.70	5.48	5.23	5.26	5.57
1924	5.38	5.47	5.63	5.82	5.94	5.79	5.65	5.67	5.53	5.52	5.43	5.35	5.59
1925	5.63	5.69	6.18	6.55	6.48	6.46	6.55	6.58	6.27	6.29	6.14	6.18	6.26
1926	6.31	6.42	6.65	6.06	6.57	6.56	6.46	6.29	6.48	6.43	6.32	6.42	6.46
1927	6.45	6.60	6.82	7.13	7.17	7.08	7.13	7.21	7.42	7.55	8.00	8.32	7.54
1928	8.48	8.72	8.81	8.92	9.09	9.10	9.19	9.51	9.96	9.93	9.27	8.94	9.18
1929	8.97	8.89	9.16	9.53	9.72	9.72	9.80	9.62	9.22	8.92	8.63	8.48	9.20
1930	8.69	8.68	8.77	8.65	8.36	8.20	7.12	6.26	6.01	6.54	6.41	6.37	7.43
1931	6.41	6.03	6.03	6.00	5.67	5.28	5.16	5.09	5.00	4.76	4.81	4.38	5.31

VEAL CALVES													
Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weight- ed aver- age
	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1922	7.23	7.84	7.85	7.26	7.28	7.67	7.49	8.00	8.10	8.17	7.92	7.78	7.68
1923	8.05	8.37	8.20	7.78	7.69	7.66	8.00	8.00	8.34	8.37	7.85	7.75	7.99
1924	8.36	8.51	8.43	8.33	8.14	7.91	7.88	7.94	8.09	8.22	7.89	7.84	8.15
1925	8.50	8.87	9.21	8.80	8.35	8.18	8.65	8.80	9.07	9.52	9.16	9.17	8.85
1926	9.44	9.68	9.75	9.45	8.92	9.65	9.47	9.54	10.06	10.29	9.54	9.44	9.61
1927	9.75	10.10	10.10	9.90	9.37	9.46	9.82	10.37	10.78	11.04	10.67	10.71	10.16
1928	10.88	11.30	11.34	11.18	11.18	11.56	11.87	12.32	13.05	12.62	11.99	11.82	11.79
1929	12.20	12.17	12.51	12.10	12.11	12.06	12.40	12.39	12.52	12.16	11.80	11.69	12.18
1930	11.84	11.69	11.24	10.73	9.68	9.83	9.19	8.78	9.20	9.30	8.84	8.48	9.83
1931	8.61	8.20	7.66	7.38	7.15	6.81	6.66	6.75	6.95	6.58	6.02	5.59	7.00

Bureau of Agricultural Economics. Based on reports of special price reporters. Monthly prices of beef cattle, by States, weighted by number of cattle Jan. 1 to obtain a price for the United States; monthly prices of veal calves, by States, weighted by number of milk cows Jan. 1 to obtain a price for the United States; yearly price obtained by weighting monthly prices by receipts at principal markets.

TABLE 319.—Feeder cattle, inspected: Shipments from public stockyards, 1922-1931

Origin and destination	Calendar year									
	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
<i>Market origin:</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>
Chicago, Ill.	332	275	246	230	245	187	171	157	132	173
Denver, Colo.	344	347	346	281	288	328	403	334	327	228
East St. Louis, Ill.	184	170	136	118	110	97	90	99	86	95
Fort Worth, Tex.	209	182	160	196	233	273	285	237	100	153
Indianapolis, Ind.	44	59	49	55	44	29	31	27	27	25
Kansas City, Kans.	1,106	1,138	901	825	706	671	684	680	650	635
Louisville, Ky.	92	33	21	27	19	34	24	17	10	7
Louisville, Ky.	41	77	56	78	69	89	80	85	70	64
Oklahoma City, Okla.	586	545	476	390	379	329	355	398	405	385
Omaha, Nebr.	280	281	249	247	300	237	274	286	252	229
Sioux City, Iowa	104	97	85	71	56	51	60	61	90	88
South St. Joseph, Mo.	306	223	173	208	291	203	198	209	153	138
South St. Paul, Minn.	198	198	193	200	152	198	205	164	217	173
Wichita, Kans.	224	194	185	177	105	268	344	326	312	301
All other inspected										
Total	4,039	3,799	3,276	3,098	3,087	2,974	3,204	3,080	2,951	2,694
<i>State destination:</i>										
Colorado	126	159	166	131	169	180	210	184	156	113
Illinois	546	500	439	437	435	290	310	313	275	321
Indiana	151	149	137	150	167	136	113	106	94	132
Iowa	841	742	570	487	577	431	499	538	506	493
Kansas	511	511	473	468	378	423	478	463	454	351
Kentucky	54	49	25	41	43	86	59	46	24	27
Michigan	50	46	47	49	41	36	41	34	21	24
Minnesota	18	22	31	36	32	25	29	42	41	28
Missouri	395	418	285	277	255	267	229	203	192	218
Missouri	659	648	565	427	374	386	474	447	561	419
Nebraska	123	113	90	97	102	93	70	83	62	93
Ohio	151	115	108	168	159	170	143	155	128	103
Oklahoma	41	27	24	31	30	31	70	44	37	39
Pennsylvania	63	70	57	38	32	50	64	75	91	45
South Dakota	111	95	128	116	151	160	196	155	123	98
Texas	30	23	23	26	29	12	12	20	14	11
Wisconsin	169	112	108	119	113	198	207	172	182	189
All other										
Total	4,039	3,799	3,276	3,098	3,087	2,974	3,204	3,080	2,951	2,694

Bureau of Agricultural Economics. Compiled from Bureau of Animal Industry inspection records.

1 Includes 2 head shipped to Alaska in 1925 and 10 head in 1926.

TABLE 320.—Cattle, choice steers for chilled beef: Average price per 100 pounds, by months, Buenos Aires, 1909-1931

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1922	4.68	4.53	3.97	3.30	3.31	3.90	4.41	4.50	4.24	3.84	3.30	3.25	3.94
1923	3.08	3.25	3.82	4.06	3.83	3.56	3.02	3.36	3.82	4.10	3.48	3.23	3.60
1924	3.10	3.40	3.61	3.50	3.56	3.76	4.51	4.93	5.15	5.95	5.62	5.42	4.38
1925	5.54	5.54	6.20	6.20	6.51	6.48	6.54	6.72	6.91	6.25	5.66	5.32	6.16
1926	5.40	5.42	5.27	5.39	5.52	5.24	5.58	5.70	5.45	4.63	4.06	4.21	5.16
1927	4.21	4.73	4.63	5.03	4.81	5.15	5.05	6.55	6.84	7.13	6.34	5.81	5.52
1928	6.11	5.86	6.21	6.33	6.65	6.99	6.79	6.60	6.67	6.38	5.61	5.32	6.29
1929	5.83	5.89	5.87	5.76	5.93	5.98	6.07	6.07	6.06	6.68	6.19	5.85	6.02
1930	5.80	5.35	5.39	5.74	5.57	5.44	5.27	5.27	5.22	4.91	4.52	3.76	5.19
1931	3.37	3.75	4.21	4.10	3.87	3.74	3.54	3.58	3.31	2.64	2.54	2.45	3.42

Bureau of Agricultural Economics. Calculated from quotations in the Review of the River Plate. Prices prior to May, 1924, originally quoted on basis of price per head supplemented by price per pound of dressed carcass weight. Calculations assume average dressed weight of 730 pounds or live weight of 1,250 pounds. Live-weight quotations per pound from May, 1924. Converted at average monthly rate of exchange as given in Federal Reserve Bulletins.

TABLE 321.—*Cattle and calves: Average price per 100 pounds, Chicago, by months, beef steers, 1909-1931; veal calves, 1922-1931*BEEF STEERS<sup>1</sup>

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1909.....	6.00	5.85	6.10	6.10	6.45	6.45	6.45	6.70	6.75	6.60	6.45	6.20	6.35
1910.....	6.20	6.35	7.35	7.55	7.50	7.50	7.10	6.85	6.80	6.60	6.20	6.00	6.80
1911.....	6.15	6.15	6.20	6.10	5.05	6.05	6.30	6.95	6.80	6.75	6.70	6.65	6.40
1912.....	6.85	6.60	7.20	7.65	7.95	8.00	7.90	8.50	8.15	7.90	8.10	7.85	7.75
1913.....	7.80	8.25	8.30	8.15	8.00	8.15	8.25	8.30	8.50	8.40	8.25	8.20	8.25
1914.....	8.45	8.30	8.35	8.50	8.40	8.60	8.50	9.10	9.35	9.05	8.60	8.35	8.65
1915.....	8.05	7.50	7.65	7.70	8.35	8.80	9.20	9.05	8.95	8.50	8.70	8.45	8.40
1916.....	8.35	8.35	8.75	9.10	9.50	9.85	9.25	9.45	9.40	9.75	10.15	10.00	9.50
1917.....	10.15	10.50	11.25	11.75	11.90	12.15	12.35	12.70	13.10	11.70	11.10	11.40	11.60
1918.....	12.10	12.00	12.00	14.70	15.40	15.85	16.05	15.75	16.00	14.80	15.05	14.90	14.65
1919.....	15.80	15.95	16.05	15.85	15.00	13.55	15.60	16.45	15.50	10.15	15.10	14.35	15.50
1920.....	13.95	13.05	13.10	12.30	12.25	14.95	15.00	14.85	15.05	14.20	12.00	10.10	13.30
1921.....	8.70	8.20	9.05	8.15	8.25	8.00	8.10	8.50	8.00	8.10	7.40	7.00	8.20
1922.....	7.23	7.62	7.87	7.90	8.21	8.76	9.42	9.52	9.84	10.23	9.16	8.76	8.65
1923.....	8.88	8.62	8.70	8.81	9.28	9.74	9.71	10.36	10.18	9.94	9.46	8.96	9.40
1924.....	8.90	8.81	9.17	9.52	9.59	9.28	9.31	9.53	9.52	9.57	8.90	8.71	9.24
1925.....	8.97	9.15	9.93	9.99	9.90	10.34	11.28	11.10	11.04	10.80	10.16	9.72	10.16
1926.....	9.48	9.42	9.42	9.11	9.07	9.51	9.44	9.30	10.00	10.00	9.48	9.43	9.47
1927.....	9.70	9.81	10.20	10.51	10.68	11.12	11.78	12.02	12.63	13.43	13.57	13.08	11.36
1928.....	13.67	13.15	12.83	13.01	13.19	13.86	15.11	15.30	15.91	14.61	13.84	12.86	13.91
1929.....	12.51	11.92	12.68	13.52	13.67	14.10	14.59	14.22	13.92	13.81	13.00	12.74	13.43
1930.....	12.62	12.46	12.33	11.88	11.15	10.59	9.42	9.48	10.95	10.64	10.47	10.17	10.95
1931.....	9.43	8.36	8.40	7.82	7.30	7.43	7.62	8.53	8.29	8.38	8.53	7.11	8.06

## VEAL CALVES

1922.....	8.36	9.16	8.26	6.97	8.46	8.89	8.90	10.88	11.92	9.65	8.91	9.42	9.15
1923.....	10.08	10.63	9.32	8.08	9.51	9.31	10.14	10.36	10.57	9.82	8.15	9.31	9.66
1924.....	11.08	10.54	9.75	9.03	9.30	8.74	9.48	10.63	10.72	10.10	9.02	9.97	9.86
1925.....	10.72	11.94	11.24	9.49	9.42	9.56	10.91	11.94	12.18	11.19	10.60	11.30	10.87
1926.....	12.18	12.43	12.06	9.91	11.04	11.09	11.38	12.46	12.50	11.50	11.09	11.31	11.61
1927.....	12.20	12.40	11.54	10.90	11.07	11.68	13.32	14.75	15.94	14.42	13.48	13.09	12.90
1928.....	13.70	15.04	13.75	13.02	13.95	13.24	14.84	16.68	17.36	14.94	14.22	13.94	14.56
1929.....	15.83	14.74	15.50	14.43	13.39	14.22	15.30	15.81	16.64	13.76	13.70	13.82	14.76
1930.....	14.80	12.66	11.96	10.55	11.36	11.03	11.37	11.98	11.83	11.33	9.53	9.77	11.51
1931.....	10.02	9.26	7.98	8.12	8.35	8.48	7.81	9.32	9.28	7.75	6.56	6.40	8.33

Bureau of Agricultural Economics. Beef-steer prices prior to 1922 from Chicago Drovers Journal Yearbook, general average native beef cattle. Subsequent figures are the weighted average price of all grades of beef steers sold out of first hands at Chicago. Veal-calf prices from the livestock and meat reporting service of the bureau on medium to choice grades prior to July 1, 1927, and subsequent prices on good and choice grades.

<sup>1</sup> Western steers not included.

TABLE 322.—Cattle and calves: Slaughter in specified countries, annual 1921-1931

Year	United States, Federal inspected	Canada, total	Argentina, including chilling, freezing, salting, and canned-meat works <sup>1</sup>	Uruguay, excluding farm <sup>2</sup>	Australia, total	New Zealand, total <sup>3</sup>
	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands
1921.....	11,416	2,017	1,550	717	1,649	304
1922.....	12,890	1,899	2,231	1,109	1,907	398
1923.....	13,663	1,860	3,538	1,393	2,049	485
1924.....	14,528	1,864	4,821	1,173	2,505	573
1925.....	15,206	1,921	3,871	1,233	2,434	550
1926.....	16,333	1,902	3,610	1,293	2,160	519
1927.....	14,396	1,993	3,723	1,239	2,189	636
1928.....	13,147	1,949	3,189	1,272	2,200	806
1929.....	12,813	1,953	3,024	1,222	1,947	811
1930.....	12,765	1,904	2,930	1,285	(*)	886
1931.....	12,824	(*)	2,453	-----	(*)	-----

Bureau of Agricultural Economics. Compiled from official sources and cabled reports from agricultural representatives abroad.

<sup>1</sup> Including municipal and private slaughterhouses, the figures were as follows in thousands—averages 1921-1925, 5,961; 1926-1930, 6,389. The numbers killed in freezing and chilling plants alone were as follows in thousands—1925, 3,342; 1926, 3,067; 1927, 3,224; 1928, 2,830; 1929, 2,792; 1930, 2,679; 1931, 2,297.

<sup>2</sup> Slaughtering in freezing and chilling plants alone were as follows in thousands—1925, 651; 1926, 714; 1927, 695; 1928, 697; 1929, 853; 1930, 1,108; 1931, 901.

<sup>3</sup> For years ended Mar. 31, following.

<sup>4</sup> Slaughter for export, only, was 426,000 in 1931 compared with 429,000 in 1930 and 471,000 in 1929.

<sup>5</sup> Inspected slaughter, only, was 963,000 in 1931 compared with 897,000 in 1930.

TABLE 323.—Cattle and calves: Average price per 100 pounds, at Chicago and Kansas City, by months, July, 1930-December, 1931

## CHICAGO

Year and month	Slaughter cattle										Vealers (milk-fed)		Feeder steers, all weights		
	Beef steers						Cows								
	900-1,100 pounds				1,100-1,300 pounds		1,300-1,600 pounds, Choice	Heifers (550-850 pounds)		Good and choice	Medium	Good and choice	Common and Medium		
	Choice	Good	Medium	Common	Choice	Good		Choice	Good						
1930															
July.....	\$11.04	\$10.00	\$8.78	\$6.96	\$11.04	\$9.95	\$10.94	\$10.32	\$9.55	\$6.83	\$5.37	\$11.37	\$10.00	\$8.12	\$6.42
August.....	10.95	10.01	8.90	6.98	10.73	9.93	10.62	10.81	9.92	6.22	4.99	11.98	10.29	7.36	5.96
September.....	12.28	11.17	9.56	7.56	12.06	10.67	11.77	12.17	10.86	6.00	4.61	11.83	9.80	7.91	6.22
October.....	12.66	11.24	9.35	7.19	11.94	10.39	11.60	12.38	11.03	6.16	4.76	11.23	9.16	8.00	6.14
November.....	13.12	11.62	9.36	7.32	12.54	10.97	11.83	12.29	10.53	5.80	4.54	9.53	7.40	8.10	6.34
December.....	13.48	11.51	9.18	7.15	13.19	11.26	12.69	11.84	9.89	5.73	4.58	9.77	7.72	8.00	6.30
Average, 6 months...	12.26	10.92	9.19	7.19	11.92	10.53	11.68	11.64	10.30	6.12	4.81	10.97	9.08	7.92	6.24
1931															
January.....	13.42	11.34	8.78	7.06	13.42	11.31	13.00	10.68	8.74	5.58	4.57	10.62	8.61	8.04	6.29
February.....	11.32	9.76	7.97	6.66	11.43	9.92	11.40	9.03	7.63	4.98	4.04	9.26	7.65	7.65	5.95
March.....	10.76	9.54	8.11	6.94	10.68	9.58	10.75	9.12	8.07	5.39	4.56	7.98	6.42	7.80	6.20
April.....	9.77	8.74	7.63	6.54	9.71	8.72	9.69	8.35	7.39	5.26	4.78	8.12	6.62	7.59	6.24
May.....	8.59	7.78	7.09	6.13	8.49	7.69	8.44	7.75	6.99	5.03	4.46	8.35	7.08	7.30	6.24
June.....	8.43	7.76	7.05	6.15	8.23	7.46	7.94	8.09	7.39	4.78	4.06	8.48	7.04	6.70	6.01
July.....	8.59	7.89	6.90	5.81	8.15	7.36	7.84	8.28	7.46	4.62	3.78	7.81	6.49	6.38	4.97
August.....	9.75	8.86	7.31	5.50	9.47	8.54	9.34	9.35	8.11	4.82	3.50	9.32	7.52	6.44	4.93
September.....	9.73	8.55	6.81	5.02	9.72	8.53	9.64	9.33	8.10	4.61	3.42	9.28	7.67	6.08	4.48
October.....	10.33	8.93	6.90	4.95	10.42	8.94	10.42	9.77	8.00	4.32	3.51	7.75	6.58	5.95	4.36
November.....	11.62	9.64	7.02	5.06	11.95	9.78	11.98	9.99	8.02	4.13	3.46	6.56	5.06	4.17	3.46
December.....	10.98	8.87	6.29	4.38	11.48	9.23	11.60	8.18	6.74	3.79	3.03	6.40	4.93	4.43	3.96
Average.....	10.27	8.97	7.32	5.85	10.26	8.92	10.17	8.99	7.72	4.78	3.93	8.33	6.80	6.80	5.28

TABLE 323.—*Cattle and calves: Average price per 100 pounds, at Chicago and Kansas City, by months, July, 1930–December, 1931—Continued*

## KANSAS CITY

Year and month	Slaughter cattle										Feeder steers					
	Beef steers						Heifers, 550-850 pounds		Cows		500-800 pounds		800-1,050 pounds			
	900-1,100 pounds				1,100-1,300 pounds		1,300-1,500 pounds Choice	Choice	Good	Good	Common and Me- dium	Good and Choice	Common and Me- dium	Good and Choice	Common and Me- dium	
	Choice	Good	Medium	Common	Choice	Good										
1930																
July	\$10.46	\$9.37	\$7.93	\$6.28	\$10.34	\$9.27	\$10.29	\$10.13	\$9.26	\$0.27	\$5.00	\$3.36	\$5.87	\$3.16	\$6.21	\$5.21
August	10.18	9.20	7.44	5.72	10.06	8.91	9.95	10.14	9.14	5.82	4.60	7.46	5.24	7.24	5.52	5.62
September	11.91	10.37	8.29	6.22	11.60	10.20	11.35	11.37	10.30	5.79	4.57	7.56	5.07	7.62	5.62	5.62
October	11.06	10.46	8.08	5.81	11.03	9.91	10.63	11.80	10.36	5.55	4.41	7.65	5.17	7.35	5.44	5.44
November	12.35	10.70	8.33	5.86	11.12	9.93	10.59	11.72	10.06	5.58	4.42	8.05	5.44	7.71	5.03	5.03
December	12.77	10.85	8.17	6.13	12.11	10.52	11.64	11.22	9.15	5.77	4.66	8.00	5.50	7.75	5.62	5.62
Average, 6 months	11.60	10.16	8.04	6.00	11.04	9.79	10.74	11.06	9.71	5.80	4.61	7.84	5.38	7.64	5.67	5.67
1931																
January	12.58	10.45	7.75	6.03	12.13	10.31	11.75	10.49	8.53	5.44	4.48	7.90	5.38	7.66	5.58	5.58
February	10.79	8.92	7.01	5.53	10.71	9.00	10.54	8.88	7.38	4.92	4.01	7.64	5.33	7.12	5.41	5.41
March	9.90	8.65	7.25	5.84	9.87	8.05	9.84	8.30	7.20	5.16	4.35	7.78	5.42	7.34	5.58	5.58
April	9.00	7.95	6.55	5.76	8.97	7.93	8.07	8.01	7.08	5.23	4.59	7.54	5.32	7.14	5.54	5.54
May	8.15	7.20	6.21	5.20	7.93	7.06	7.76	7.55	6.76	4.40	4.18	7.23	5.18	6.71	5.34	5.34
June	8.08	7.30	6.33	5.09	7.67	6.89	7.48	7.88	7.24	4.40	3.62	6.67	4.74	6.21	4.87	4.87
July	8.13	7.22	6.02	4.78	7.59	6.90	7.29	7.94	7.24	4.06	3.19	6.13	4.10	5.81	4.42	4.42
August	9.39	8.38	6.48	4.80	8.99	8.04	8.78	8.96	7.90	4.13	3.22	6.22	3.90	6.20	4.22	4.22
September	9.12	7.96	5.78	4.00	9.00	7.76	8.87	8.63	7.26	3.96	3.07	5.61	3.82	5.58	3.89	3.89
October	9.58	8.01	5.81	4.06	9.71	8.10	9.71	8.60	7.04	4.02	3.25	5.50	3.70	5.42	3.78	3.78
November	10.92	8.72	5.61	3.86	11.06	8.76	11.06	9.02	7.18	3.99	3.20	5.79	3.84	5.56	3.85	3.85
December	9.54	7.91	5.01	3.53	10.14	7.59	10.21	7.81	6.11	3.69	3.00	5.21	3.43	5.07	3.00	3.00
Average	9.62	8.22	6.34	4.88	9.48	8.11	9.30	8.50	7.25	4.48	3.68	6.60	4.52	6.32	4.67	4.67

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-reporting service of the bureau. Earlier data in 1927 Yearbook, pp. 991-994, and in 1931 Yearbook, pp. 834-835.

TABLE 324.—*Cattle and calves: Slaughter<sup>1</sup> under Federal inspection by months, 1922-1931*

## CATTLE

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands
1922	642	569	674	590	702	724	697	761	791	834	859	779	8,678
1923	745	624	688	697	702	727	725	821	810	953	846	756	9,163
1924	812	669	666	689	773	670	764	746	870	1,016	952	920	9,593
1925	855	656	736	731	749	732	862	811	866	1,067	801	927	9,853
1926	810	695	786	706	788	852	864	811	971	996	947	887	10,180
1927	786	700	761	742	785	799	743	838	828	895	881	761	9,520
1928	711	666	665	623	723	706	662	717	764	801	702	667	8,407
1929	736	569	632	662	676	636	706	728	753	839	713	658	8,324
1930	713	561	615	635	689	654	710	700	790	836	605	692	8,170
1931	651	559	635	690	704	667	706	727	687	781	614	686	8,108

## CALVES

1922	288	279	301	365	401	389	329	345	353	383	348	309	4,182
1923	351	297	368	400	467	388	379	403	338	416	370	324	4,500
1924	373	346	377	406	470	408	421	374	419	473	392	416	4,935
1925	394	378	466	496	481	473	473	439	422	486	398	445	5,353
1926	410	378	404	461	455	480	425	379	408	446	435	410	5,153
1927	397	377	457	454	462	430	355	389	367	413	410	376	4,877
1928	383	374	407	438	473	398	362	369	352	405	378	341	4,680
1929	369	311	409	460	427	344	363	338	365	398	368	346	4,489
1930	374	329	388	455	421	356	375	363	374	438	324	398	4,595
1931	379	353	416	471	425	417	356	357	393	407	355	388	4,717

Bureau of Animal Industry.

<sup>1</sup> The figures include condemned carcasses.

TABLE 325.—Beef and beef products: International trade, average 1925-1929, annual 1928-1930

Country	Calendar year							
	Average 1925-1929		1928		1929		1930 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
<b>PRINCIPAL EXPORTING COUNTRIES</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
Argentina.....	1,552,601	93	1,309,898	238	1,234,142	63	1,114,480	66
Uruguay.....	287,281	0	226,384	0	215,404	0	329,829	0
Australia.....	284,476	1,711	245,146	2,385	277,586	1,211	224,986	893
Netherlands <sup>2</sup> .....	237,540	159,721	235,890	128,389	205,521	117,779	179,228	137,113
United States.....	144,303	45,769	119,779	81,029	126,442	69,298	117,985	15,339
New Zealand.....	115,286	626	143,181	602	91,082	796	103,008	592
Brazil.....	109,765	7,221	148,633	9,198	167,272	5,535	232,362	5,794
Canada.....	42,516	1,867	52,111	2,649	33,192	5,324	10,016	3,784
Denmark.....	27,793	12,359	10,857	10,725	14,613	11,142	51,966	9,493
Union of South Africa.....	23,193	8,935	17,793	9,138	26,950	9,153	30,585	6,311
Poland.....	17,646	2,032	13,222	2,395	12,918	1,521	23,457	1,904
Rumania.....	11,678	4,387	11,446	5,529	13,705	2,8	118,989	2
Irish Free State.....	8,992	8,581	14,478	9,515	4,518	4,518	4,946	656
China.....	5,071	1,619	4,908	2,205	3,050	1,865	3,061	1,815
Hungary.....	4,834	207	2,661	53	3,838	60	9,026	39
<b>Total.....</b>	<b>2,872,975</b>	<b>251,128</b>	<b>2,556,147</b>	<b>25,535</b>	<b>2,434,230</b>	<b>228,233</b>	<b>2,464,614</b>	<b>183,771</b>
<b>PRINCIPAL IMPORTING COUNTRIES</b>								
United Kingdom.....	34,845	1,795,364	29,178	1,749,139	23,440	1,638,097	29,176	1,640,993
Germany.....	4,267	386,911	5,887	332,852	8,666	263,740	21,478	193,629
France.....	35,552	147,055	45,712	65,515	39,973	57,160	33,073	112,043
Belgium.....	37,959	122,165	31,866	83,263	18,977	76,711	19,638	88,662
Japan.....	0	63,201	0	68,918	0	68,059	0	69,888
Cuba.....	267	44,490	1,076	45,773	258	43,418	0	31,031
Italy.....	335	23,611	236	24,050	310	16,833	261	21,620
Sweden.....	8,769	19,664	6,961	15,416	7,518	15,028	9,333	16,430
Spain.....	55	16,785	220	16,170	20	17,731	41	12,715
Norway.....	1,880	14,365	2,434	12,741	2,634	11,295	1,579	9,949
British India.....	1,254	11,348	1,399	9,279	1,247	10,969	978	11,233
Philippine Islands.....	0	11,013	0	10,321	0	10,840	0	6,446
Czechoslovakia.....	464	8,165	529	2,738	410	4,918	247	6,349
British Malaya.....	632	6,958	679	7,607	842	7,500	728	6,940
Switzerland.....	799	6,373	611	6,530	963	7,401	626	6,892
Finland.....	899	5,235	62	5,814	103	5,643	-----	4,150
Egypt.....	11	4,767	16	5,416	10	5,986	0	2,969
Chile.....	125	3,645	129	780	176	2,711	38,784	-----
<b>Total.....</b>	<b>126,843</b>	<b>2,696,113</b>	<b>125,886</b>	<b>2,465,322</b>	<b>105,541</b>	<b>2,254,639</b>	<b>100,937</b>	<b>2,241,949</b>

Bureau of Agricultural Economics. Official sources, except as otherwise noted.

<sup>1</sup> Preliminary.<sup>2</sup> International Yearbook of Agricultural Statistics.<sup>3</sup> Year ended June 30.<sup>4</sup> 4-year average.

TABLE 326.—Beef, frozen, cured, and in process of cure: Stocks in cold-storage warehouses and meat-packing establishments, United States, 1922-1931

Kind and year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Beef frozen:	pounds	pounds	pounds	pounds	pounds	pounds	pounds	pounds	pounds	pounds	pounds	pounds
1922.....	68,495	61,522	55,785	50,772	45,341	37,548	31,593	27,727	28,210	34,611	47,929	73,027
1923.....	91,805	89,272	75,604	65,292	54,522	41,207	34,885	24,112	24,825	27,590	43,772	71,024
1924.....	82,984	79,944	76,769	68,075	52,941	41,784	37,028	29,435	29,135	28,599	45,857	76,731
1925.....	114,034	111,947	101,599	87,684	67,271	46,887	36,452	26,870	22,879	19,755	27,008	50,438
1926.....	59,850	55,705	51,498	43,528	32,372	26,649	23,997	23,509	21,311	25,267	38,079	59,803
1927.....	72,352	67,431	60,659	50,945	39,712	28,719	23,261	18,552	17,241	19,456	26,606	45,587
1928.....	54,968	50,673	44,017	37,625	28,253	20,654	17,256	18,896	17,603	22,463	41,635	60,189
1929.....	77,051	72,117	67,486	60,664	51,442	39,878	35,759	31,085	32,122	38,966	51,902	70,390
1930.....	77,230	72,692	69,800	64,146	57,273	49,913	46,819	45,830	42,433	43,515	47,221	54,894
1931.....	55,649	52,130	47,334	41,509	34,082	31,195	28,842	25,211	24,061	20,961	20,871	25,364
Beef, cured and in process of cure:												
1922.....	16,313	16,774	17,997	18,744	19,166	19,304	19,113	19,304	20,081	18,961	19,884	22,602
1923.....	24,450	24,841	24,987	25,210	24,013	23,816	22,835	21,781	21,410	20,597	19,649	22,142
1924.....	22,593	22,711	23,238	25,199	25,432	24,285	22,390	20,877	19,771	18,939	21,887	23,508
1925.....	28,930	28,758	29,210	28,634	28,952	27,731	25,102	22,704	22,338	20,964	20,473	23,128
1926.....	26,146	24,633	26,192	27,253	27,606	25,980	24,691	22,639	20,896	20,953	23,119	26,374
1927.....	28,521	27,323	27,361	26,214	23,219	21,694	20,495	17,170	16,205	16,422	17,220	19,778
1928.....	21,879	20,978	19,732	19,631	17,941	16,558	14,982	13,646	13,462	14,700	16,401	19,444
1929.....	21,892	21,879	21,235	20,943	19,272	17,437	16,296	14,845	15,892	17,438	20,157	23,054
1930.....	26,653	26,328	25,798	24,597	23,647	21,643	20,072	18,761	17,822	16,508	16,041	18,496
1931.....	19,636	20,268	20,288	19,602	19,068	18,253	16,706	15,844	14,989	14,310	13,538	13,794

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

TABLE 327.—Cattle-tick eradication: Progress and status of the work December 1, 1931

State	Quarantined counties		Released counties Dec. 1, 1931			Released counties tick free on—			Cattle inspected and dipped, year ended Dec. 1, 1931	
	July 1, 1906	Dec. 1, 1931	Tick free	With 1 or more infested herds	Total counties released	Nov. 1, 1929	Nov. 1, 1930	Nov. 1, 1931	Herds	Cattle
Alabama.....	67	0	67	0	67	63	64	67	56,246	456,433
Arkansas.....	75	8	55	12	67	45	53	55	345,047	1,720,724
California.....	15	0	15	0	15	15	15	15	0	0
Florida.....	67	25	41	1	42	30	33	41	104,494	1,646,647
Georgia.....	158	0	158	0	158	155	158	158	13,108	127,858
Kentucky.....	2	0	2	0	2	2	2	2	0	0
Louisiana.....	64	42	17	5	22	3	10	17	59,300	773,051
Mississippi.....	82	0	77	5	82	55	78	77	10,206	91,846
Missouri.....	4	0	4	0	4	4	4	4	0	0
North Carolina.....	73	0	73	0	73	73	70	73	7,046	30,927
Oklahoma.....	61	0	61	0	61	60	61	61	2,215	23,420
South Carolina.....	46	0	46	0	46	46	46	46	3,051	28,263
Tennessee.....	42	0	42	0	42	42	42	42	0	0
Texas.....	198	52	113	33	146	94	116	113	602,261	10,790,719
Virginia.....	31	0	30	1	31	30	31	30	2,903	2,903
Total.....	985	127	801	57	858	717	783	801	1,203,921	15,698,196

Bureau of Animal Industry.

\*More than 13,000 dipping vats were in use for official dipping during the year.

TABLE 328.—Cattle and calves: Shipments, slaughter, and income, by States, 1930

State and division	Shipments and local slaughter				Inshipments, stocker, feeding, breeding, and dairy		Farm slaughter				Value of amount consumed on farms	Receipts from sales	Gross income	Value of production	
	Cattle		Calves		Head	Total weight	Head	Total weight	Calves						
	Head	Total weight	Head	Total weight					Head	Total weight					
	Thou- sands	1,000 pounds	Thou- sands	1,000 pounds	Thou- sands	1,000 pounds	Thou- sands	1,000 pounds	Thou- sands	1,000 pounds	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	
North Atlantic	Maine.....	28	22,000	43	4,925	2	1,600	10	7,000	15	1,575	384	2,657	2,791	2,805
	New Hampshire.....	21	17,040	34	3,825	6	4,920	3	2,400	5	1,548	1,548	1,548	1,571	1,571
	Vermont.....	46	37,460	138	15,928	8	6,560	13	9,100	14	1,750	4,434	4,434	4,534	4,534
	Massachusetts.....	41	33,020	71	8,220	23	19,550	8	2,400	5	1,700	293	1,650	1,650	2,027
	Rhode Island.....	8	6,900	10	1,225	6	4,980	1	7,470	1	250	16	1,038	1,038	1,038
	Connecticut.....	26	20,290	51	6,325	9	7,470	1	800	2	250	30	1,406	1,436	1,895
	New York.....	232	198,400	702	102,080	35	26,700	34	28,900	56	8,736	1,176	24,267	25,442	27,553
	New Jersey.....	34	30,000	74	11,470	23	19,550	1	28,900	5	775	57	1,476	1,533	3,404
	Pennsylvania.....	235	205,625	451	67,650	61	45,760	34	28,900	50	7,500	1,343	23,864	25,212	24,294
		670	571,535	1,574	221,640	174	140,080	100	81,100	153	22,136	3,133	61,056	64,189	67,698
North Central, East	Ohio.....	295	245,100	457	73,120	58	38,860	31	26,350	28	4,480	1,548	26,853	28,401	27,053
	Indiana.....	313	281,700	340	51,000	143	102,246	17	13,175	20	5,000	959	22,619	23,762	23,762
	Illinois.....	767	713,310	458	65,220	437	314,640	17	14,025	37	7,400	1,072	46,019	47,091	47,243
	Michigan.....	217	179,025	380	58,900	27	16,200	35	23,000	76	12,008	1,336	22,676	23,440	23,728
	Wisconsin.....	376	374,500	1,065	124,775	44	32,120	12	10,800	103	12,875	1,560	37,050	37,640	41,418
		1,959	1,791,635	2,720	373,015	709	504,065	112	92,350	264	41,763	5,505	153,881	159,386	164,204
	Minnesota.....	655	572,350	655	90,556	195	130,650	38	31,540	78	17,160	2,719	42,853	45,572	49,023
	Iowa.....	1,550	1,495,500	280	44,000	687	460,280	29	24,880	30	6,000	2,208	100,988	103,194	105,167
	Missouri.....	840	755,000	407	61,050	481	303,090	10	16,000	16	4,000	1,841	44,298	45,767	48,249
	North Dakota.....	252	210,420	76	10,640	20	14,000	18	14,040	27	8,100	2,248	14,366	15,614	19,461
North Central, West	South Dakota.....	539	463,540	67	15,410	130	87,100	18	16,480	12	3,600	1,312	32,981	34,293	37,671
	Nebraska.....	1,281	1,219,215	186	47,505	714	478,350	25	21,000	25	2,240	2,240	80,245	82,455	87,130
	Kansas.....	1,430	1,315,000	185	50,700	838	506,960	33	26,400	15	5,250	1,872	69,016	70,883	76,923
		6,577	6,032,625	1,846	310,351	3,063	1,983,410	181	148,320	203	51,610	12,438	385,375	397,813	424,254
North Central	8,536	7,824,260	4,556	692,876	3,772	2,457,475	293	240,670	467	93,373	17,943	530,256	557,199	588,428	
Delaware.....	3	2,400	25	3,510	7	4,900	1	800	1	375	25	683	683	708	674
Maryland.....	30	25,500	119	16,065	4	4,900	4	3,400	4	540	119	3,670	3,759	3,894	3,894
Virginia.....	140	123,780	203	20,020	6	2,760	11	8,250	11	1,400	293	11,421	11,490	10,882	10,882
West Virginia.....	95	82,500	109	19,075	1	636	10	8,250	15	2,625	293	8,428	8,721	6,989	6,989

North Carolina.....	35	24,500	69	7,375	1	700	18	10,800	25	3,125	370	3,280	3,650	4,798
South Carolina.....	36	25,200	36	4,500	19	9,120	8	4,800	9	1,125	87	2,028	2,116	2,043
Georgia.....	104	40,920	90	15,750	1	1,400	12	17,280	30	5,700	346	4,832	6,178	6,447
Florida.....	47	22,325	43	5,620	2	1,400	12	5,700	7	805	83	2,047	2,130	1,573
South Atlantic.....	480	356,095	687	92,415	35	19,505	100	59,280	102	15,495	1,621	36,389	38,010	35,980
Kentucky.....	225	185,750	219	35,300	30	21,000	8	6,000	18	3,960	323	15,904	16,227	12,969
Tennessee.....	186	147,740	128	17,010	19	13,300	10	7,000	18	4,500	282	10,850	11,142	11,209
Alabama.....	85	44,625	83	12,450	10	4,000	25	11,250	25	4,375	305	3,688	3,993	4,139
Mississippi.....	143	85,800	66	9,900	7	3,500	12	6,480	30	4,800	184	4,282	5,016	6,596
Arkansas.....	116	71,425	39	6,825	1	500	32	15,200	30	6,300	287	4,268	4,555	4,451
Louisiana.....	82	49,200	47	6,850	20	7,000	84	11,280	17	3,060	457	4,002	4,459	5,137
Oklahoma.....	668	611,020	191	47,750	321	216,675	15	10,500	21	6,250	580	20,921	21,451	27,900
Texas.....	1,132	894,280	774	215,720	212	154,760	30	19,500	80	22,400	1,367	62,929	64,296	66,737
South Central.....	2,637	1,989,840	1,645	352,535	620	490,735	156	87,210	239	54,645	3,745	127,394	131,139	137,478
Montana.....	318	286,200	40	8,000	52	36,000	13	11,180	14	3,500	669	18,871	19,530	21,866
Idaho.....	129	116,100	36	6,480	27	18,900	6	4,500	17	2,720	162	7,491	7,633	9,229
Wyoming.....	205	169,125	17	5,525	41	26,650	5	4,125	6	1,980	368	10,886	11,194	13,132
Colorado.....	473	401,300	64	17,600	210	163,800	12	9,000	16	4,500	694	22,567	23,201	25,403
New Mexico.....	380	266,000	77	23,100	135	86,400	12	8,100	14	4,200	663	13,834	14,497	14,790
Arizona.....	208	143,136	100	27,000	89	61,588	8	5,218	12	3,000	386	6,488	6,884	10,873
Utah.....	93	86,650	35	7,000	15	11,250	4	3,400	8	1,600	204	6,388	6,592	6,643
Nevada.....	67	62,000	14	3,060	7	6,600	2	3,000	2	7,425	667	7,914	8,800	9,465
Washington.....	82	73,800	79	14,220	6	4,500	13	9,750	45	7,425	453	7,914	8,367	9,365
Oregon.....	182	128,040	46	9,200	12	9,000	17	13,260	32	8,800	368	11,330	11,688	12,808
California.....	570	638,500	350	81,900	353	298,988	20	17,000	28	6,020	1,102	30,918	32,020	32,690
Western.....	2,657	2,270,851	858	203,105	947	695,674	114	89,131	193	40,185	6,182	141,304	146,498	160,544
United States.....	14,980	13,012,681	9,180	1,562,571	5,548	3,703,469	703	557,391	1,163	225,824	31,624	905,399	937,023	990,023

Bureau of Agricultural Economics. Estimates Division Crop and Livestock Estimates subject to revision. For 5-year average 1924-1928, see 1931 Yearbook Tables 370 and 371. The figures on income and value of production as shown in Table 456 are computed from the data shown in this table. The difference between gross income and value of production arises from the fact that in computing value of production allowance is made for changes in inventory numbers between the beginning and end of the year while in computing income these changes are not used.

TABLE 329.—*Hogs: Number on farms and value per head in the United States, 1840, 1850, 1860, 1867–1932*

Year	Hogs on farms		Year	Hogs on farms	
	Number <sup>1</sup>	Value per head Jan. 1 <sup>2</sup>		Number <sup>1</sup>	Value per head Jan. 1 <sup>2</sup>
	Thousands	Dollars		Thousands	Dollars
1840 <sup>4</sup>	26,501	—	1900 <sup>5</sup>	37,079	—
1850 <sup>4</sup>	30,554	—	1900 <sup>4</sup>	62,868	—
1860 <sup>4</sup>	33,613	—	1900 <sup>4</sup>	52,600	5.28
1867	24,694	4.03	1901	53,200	6.55
1868	24,317	3.29	1902	46,800	7.43
1869	23,316	4.65	1903	47,200	8.22
1870 <sup>4</sup>	25,155	—	1904	49,500	6.50
1870	26,751	5.80	1905	52,000	6.33
1871	29,458	5.61	1906	54,600	6.53
1872	31,796	4.01	1907	57,300	8.05
1873	32,632	3.67	1908	61,300	6.39
1874	30,861	3.98	1909	57,000	6.92
1875	28,082	4.80	1910 <sup>4</sup>	58,188	—
1876	25,727	6.00	1910	40,300	9.69
1877	28,077	5.66	1911	55,700	9.90
1878	32,212	4.85	1912	55,700	8.46
1879	31,766	3.18	1913	54,000	10.42
1880 <sup>4</sup>	47,682	—	1914	51,800	10.99
1880	34,034	4.28	1915	57,000	10.43
1881	36,248	4.70	1916	59,700	8.88
1882	44,122	5.97	1917	56,700	12.42
1883	43,270	6.75	1918	61,200	20.65
1884	44,201	5.57	1919	63,800	23.28
1885	45,143	5.02	1920 <sup>4</sup>	59,346	—
1886	46,092	4.26	1920	60,159	20.00
1887	44,613	4.48	1921	58,942	13.63
1888	44,347	4.08	1922	59,849	10.58
1889	50,302	5.79	1923	69,304	12.29
1890 <sup>4</sup>	67,410	—	1924	66,876	10.30
1890	51,603	4.72	1925 <sup>4</sup>	60,854	—
1891	50,625	4.15	1925	55,770	13.15
1892	52,398	4.60	1926	52,085	15.66
1893	46,095	6.41	1927	55,468	17.19
1894	45,266	5.98	1928	61,772	13.17
1895	44,166	4.97	1929	58,789	12.94
1896	42,843	4.35	1930 <sup>4</sup>	56,293	—
1897	40,600	4.10	1930	55,301	13.46
1898	39,760	4.39	1931	54,374	11.36
1899	38,652	4.40	1932 <sup>6</sup>	59,511	6.14

Bureau of Agricultural Economics. Estimates of the crop reporting board. Revisions for the years 1920–1931 were made January, 1932.

<sup>1</sup> Prior to 1900 estimates for each 10-year period represent an index of annual changes applied to census as base on first report after census data were available: 1900–1919 are tentative revised estimates of the Bureau of Agricultural Economics as first published in 1927 Yearbook.

<sup>2</sup> Series for 1867–1899 are values of all hogs as reported.

<sup>3</sup> Data for 1900–1925 are an old series for all hogs as reported, adjusted on basis average relationship between the new and the old series from 1926 to 1928. Old series was shown in 1923 Yearbook. (Conversion factor was 1.057 (base was old series). Data for 1926–1932 are a new series, referred to above, of average values by age and sex classification weighted by numbers in each class.

<sup>4</sup> Italic figures are from the census. Figures for census years 1880 and 1890 exclude estimate of unenumerated swine on ranges as follows: 1880, 2,093,970; 1890, 17,276. Census dates were June 1 from 1840 to 1900; Apr. 15, 1910, Jan. 1, 1920 and 1926; Apr. 1, 1930. 1900, 1910, and 1930 include spring-born pigs.

<sup>5</sup> Original estimate of the Bureau of Agricultural Economics.

<sup>6</sup> Preliminary.

TABLE 330.—Hogs, including pigs: Estimated number on farms and value per head, by States, January 1, 1928-1932

State and division	Number					Value per head <sup>1</sup>				
	1928 <sup>2</sup>	1929 <sup>2</sup>	1930 <sup>2</sup>	1931 <sup>2</sup>	1932 <sup>2</sup>	1928	1929	1930	1931	1932
	Thousands	Thousands	Thousands	Thousands	Thousands	Dollars	Dollars	Dollars	Dollars	Dollars
Maine.....	70	53	49	50	55	15.00	14.80	14.80	12.90	8.70
New Hampshire.....	29	24	18	15	15	16.10	13.60	15.20	13.10	8.90
Vermont.....	56	38	30	29	32	14.90	13.60	14.60	12.00	7.50
Massachusetts.....	97	90	97	101	101	15.30	16.00	16.10	14.00	8.60
Rhode Island.....	5	5	5	5	5	18.60	18.00	17.60	15.40	8.00
Connecticut.....	24	28	24	26	25	20.20	18.80	17.00	15.50	9.20
New York.....	341	290	232	195	205	15.10	14.20	15.40	12.40	8.70
New Jersey.....	80	72	72	72	78	14.90	15.70	16.20	13.00	10.70
Pennsylvania.....	792	734	683	642	655	14.70	13.90	14.40	12.40	8.50
North Atlantic.....	1,494	1,334	1,210	1,135	1,171	14.99	14.34	14.95	12.71	8.71
Ohio.....	2,537	2,309	2,078	1,974	2,072	12.50	11.50	12.40	10.00	6.60
Indiana.....	3,227	3,066	2,637	2,637	2,900	13.00	12.30	12.60	10.70	6.90
Illinois.....	5,274	4,852	4,415	4,415	4,940	13.80	13.80	14.80	12.60	6.90
Michigan.....	582	759	630	542	661	12.40	12.20	12.30	10.50	6.90
Wisconsin.....	1,720	1,534	1,422	1,536	1,658	12.90	14.20	14.30	12.50	5.90
North Central, East.....	13,620	12,520	11,182	11,104	12,231	13.13	12.96	13.63	11.57	6.74
Minnesota.....	3,680	3,366	3,494	3,665	3,738	15.10	15.70	16.30	13.10	6.30
Iowa.....	11,124	10,244	10,200	10,509	11,350	14.40	15.10	16.00	13.40	6.30
Missouri.....	4,270	4,313	3,750	3,488	4,011	11.70	12.20	11.40	8.90	5.70
North Dakota.....	689	772	730	766	650	13.80	14.50	14.50	12.40	5.40
South Dakota.....	3,000	2,700	2,800	3,000	2,490	15.30	15.20	16.00	13.40	5.40
Nebraska.....	5,340	5,305	5,010	4,820	5,110	15.50	15.00	15.60	13.40	5.90
Kansas.....	2,531	3,006	2,826	2,487	3,109	13.70	12.80	12.80	10.50	5.50
North Central, West.....	30,634	29,706	28,810	28,735	30,458	14.22	14.49	15.01	12.53	5.98
North Central.....	44,254	42,226	39,992	39,839	42,689	13.95	14.04	14.62	12.26	6.20
Delaware.....	28	26	25	23	22	12.00	10.80	11.70	10.80	8.60
Maryland.....	221	206	198	168	160	12.30	10.80	10.60	9.50	7.50
Virginia.....	659	626	597	508	551	11.20	9.90	10.00	8.00	6.10
West Virginia.....	228	208	200	168	176	12.80	11.60	10.90	8.50	7.80
North Carolina.....	1,050	945	830	838	880	12.90	11.70	11.60	10.20	6.60
South Carolina.....	558	503	480	504	580	11.20	9.00	9.60	8.40	5.60
Georgia.....	1,500	1,393	1,312	1,299	1,890	9.40	8.20	9.70	8.40	5.00
Florida.....	543	531	519	498	508	7.60	8.10	7.50	6.10	3.70
South Atlantic.....	4,787	4,438	4,161	4,006	4,267	10.73	9.56	9.93	8.56	5.88
Kentucky.....	1,040	988	920	782	899	9.90	8.80	9.60	7.60	5.80
Tennessee.....	1,103	1,035	952	835	1,075	10.20	8.60	9.70	8.20	6.30
Alabama.....	982	912	845	870	987	10.40	9.50	10.50	7.60	5.40
Mississippi.....	911	844	780	764	878	8.90	8.70	9.30	7.00	5.30
Arkansas.....	1,041	885	764	574	832	8.60	8.60	8.60	6.70	5.80
Louisiana.....	527	596	637	605	679	9.20	9.70	9.80	7.30	6.50
Oklahoma.....	1,104	1,215	1,053	927	1,205	11.10	9.60	9.40	8.10	5.00
Texas.....	1,800	1,790	1,673	1,606	2,088	11.50	9.70	9.70	8.20	6.00
South Central.....	8,568	8,225	7,654	7,061	8,613	10.18	9.15	9.61	7.75	5.75
Montana.....	270	300	280	280	283	14.30	13.10	12.10	11.30	5.30
Idaho.....	336	285	245	270	351	12.90	11.70	11.50	10.90	5.00
Wyoming.....	170	150	130	137	123	13.50	12.50	12.00	10.80	5.40
Colorado.....	509	550	495	520	624	13.10	12.10	12.00	11.10	5.20
New Mexico.....	67	65	65	62	74	10.40	10.70	10.80	9.60	5.70
Arizona.....	23	25	21	21	23	13.10	13.30	13.30	10.30	5.00
Utah.....	90	74	70	77	96	11.50	10.20	10.50	9.70	5.20
Nevada.....	26	23	20	18	21	12.30	12.50	11.50	9.90	6.70
Washington.....	238	214	178	183	238	14.10	12.70	13.00	11.90	6.80
Oregon.....	270	230	195	205	266	12.20	10.50	11.70	11.10	6.20
California.....	670	650	590	560	672	13.60	12.60	12.00	11.10	6.30
Western.....	2,669	2,506	2,284	2,333	2,771	13.22	12.15	11.95	11.05	5.75
United States.....	61,772	58,780	55,301	54,374	59,511	13.17	12.94	13.46	11.38	6.14

Bureau of Agricultural Economics. Estimates of the crop-reporting board. Revisions by States, 1920-1927, are published in February, 1932, Crops and Markets.

<sup>1</sup> Sum of total value of subgroups (classified by age and sex), divided by total number and rounded to nearest dime for States. Division and United States averages not rounded. State figures are new weighted value series not comparable to State figures previously published years prior to 1925.

<sup>2</sup> Revised, January, 1932.

<sup>3</sup> Preliminary.

TABLE 331.—Hogs: Numbers in countries having 150,000 and over, average 1921–1925, annual 1926–1931

Country	Month of estimate	Average 1921– 1925 <sup>1</sup>	1926	1927	1928	1929	1930	1931
<b>North and Central America and West Indies:</b>								
United States.....	January.....	Thous- 62,088	Thous- 52,083	Thous- 55,408	Thous- 61,772	Thous- 58,789	Thous- 55,301	Thous- 54,374
Canada.....	June.....	4,344	4,360	4,695	4,497	4,382	4,000	-----
Mexico.....	do.....	<sup>2</sup> 1,125	2,903	-----	-----	-----	-----	-----
Guatemala.....	-----	57	92	70	89	72	79	-----
Salvador.....	-----	(330)	-----	-----	-----	-----	<sup>3</sup> 335	-----
Cuba.....	-----	(591)	-----	-----	-----	-----	591	-----
Dominican Repub- lic.....	May.....	866	-----	-----	-----	-----	-----	-----
Haiti.....	-----	-----	170	185	200	220	-----	-----
Estimated total <sup>4</sup> .....	-----	73,000	-----	-----	-----	-----	-----	-----
<b>South America:</b>								
Colombia.....	-----	1,352	1,400	1,366	-----	-----	1,434	-----
Venezuela.....	-----	512	-----	-----	-----	-----	-----	-----
Ecuador.....	-----	150	-----	-----	-----	153	-----	-----
Peru.....	February–April.....	429	-----	-----	-----	<sup>5</sup> 689	-----	-----
Bolivia.....	-----	362	498	268	-----	336	-----	-----
Chile.....	-----	255	-----	-----	-----	-----	<sup>6</sup> 331	-----
Brazil.....	September.....	<sup>7</sup> 16,169	-----	-----	-----	-----	-----	<sup>8</sup> 20,000
Uruguay.....	-----	278	-----	-----	-----	-----	<sup>9</sup> 300	-----
Argentina.....	December <sup>7</sup> .....	<sup>10</sup> 1,437	-----	-----	-----	-----	<sup>11</sup> 3,769	-----
Estimated total <sup>4</sup> .....	-----	21,000	-----	-----	-----	-----	-----	-----
<b>Europe:</b>								
England and Wales	June.....	2,658	2,200	2,692	2,971	2,367	2,310	2,777
Isle of Man.....	do.....	4	3	4	4	3	4	-----
Scotland.....	do.....	167	145	197	196	142	143	154
Northern Ireland	do.....	134	150	236	220	192	216	226
Irish Free State.....	do.....	947	894	1,178	1,183	945	1,052	1,227
Norway <sup>12</sup> .....	do.....	216	303	300	283	289	339	317
Sweden.....	do.....	1,056	1,369	-----	-----	-----	<sup>13</sup> 1,684	1,761
Denmark.....	July.....	2,314	3,122	3,731	3,363	3,618	4,872	5,473
Netherlands.....	May–June.....	1,619	-----	-----	-----	-----	2,018	<sup>14</sup> 2,434
Belgium.....	December <sup>7</sup> .....	1,081	1,152	1,144	1,124	1,139	1,237	1,250
France.....	do <sup>7</sup> .....	4,302	5,793	5,777	6,019	6,017	6,102	6,329
Spain.....	do <sup>7</sup> .....	4,500	5,267	5,082	-----	<sup>15</sup> 4,773	-----	-----
Portugal.....	do.....	1,019	-----	-----	-----	-----	-----	-----
Italy.....	March–April.....	2,630	<sup>16</sup> 2,850	-----	-----	-----	<sup>17</sup> 3,167	-----
Switzerland.....	April.....	840	637	-----	-----	-----	-----	<sup>18</sup> 924
Germany.....	December <sup>7</sup> .....	15,776	16,200	19,424	22,899	20,106	19,944	23,305
Austria.....	do <sup>7</sup> .....	1,399	-----	-----	-----	-----	<sup>19</sup> 1,305	-----
Czechoslovakia.....	do <sup>7</sup> .....	2,201	2,539	-----	-----	-----	<sup>20</sup> 2,088	2,776
Hungary.....	April and July.....	2,424	2,520	2,387	2,662	2,582	2,362	2,715
Yugoslavia.....	January.....	2,875	2,806	2,770	2,663	2,676	(2,500)	2,924
Greece.....	December <sup>7</sup> .....	390	452	510	453	410	276	-----
Bulgaria.....	do <sup>7</sup> .....	832	-----	1,002	-----	-----	-----	-----
Rumania.....	do <sup>7</sup> .....	2,676	3,088	3,168	2,987	2,694	2,300	2,323
Poland.....	November.....	5,287	-----	6,333	-----	<sup>21</sup> 4,820	<sup>22</sup> 6,047	<sup>23</sup> 7,314
Lithuania.....	Spring.....	1,321	1,441	1,019	1,060	944	1,136	-----
Latvia.....	June.....	465	521	535	535	<sup>24</sup> 382	523	712
Estonia.....	July.....	299	333	354	327	279	280	-----
Finland.....	September.....	378	391	418	435	426	-----	-----
Russia, European and Asiatic <sup>13</sup> .....	Summer.....	21,184	20,920	23,202	26,100	20,500	18,200	-----
Estimated total excluding Rus- sia <sup>4</sup> .....	-----	61,100	-----	-----	-----	-----	-----	-----
<b>Africa:</b>								
Union of South Africa.....	April–August.....	888	932	870	857	820	-----	-----
Madagascar.....	February.....	369	386	335	328	412	531	-----
Estimated total <sup>4</sup> .....	-----	2,200	-----	-----	-----	-----	-----	-----
<b>Asia:</b>								
China (including Turkestan and Manchuria).....	-----	<sup>14</sup> 62,500	-----	-----	-----	-----	-----	-----
Japan.....	December <sup>7</sup> .....	590	673	621	-----	764	706	-----
Chosen.....	do <sup>7</sup> .....	1,078	1,150	1,221	1,244	1,277	1,323	1,387
Taiwan.....	do.....	1,302	1,435	1,543	1,643	1,718	1,764	-----
French-Indo China.....	-----	2,767	2,361	2,361	2,621	2,782	3,049	-----

See footnotes at end of table.

TABLE 331.—*Hogs: Numbers in countries having 150,000 and over, average 1921-1925, annual 1926-1931—Continued*

Country	Month of estimate	Average 1921- 1925 <sup>1</sup>	1926	1927	1928	1929	1930	1931
Asia—Continued.		<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>
Siam.....	March.....	864						
Straits Settlements.....		220						
Philippine Islands.....	December <sup>7</sup> .....	5,798	8,885	9,298	9,798			
Dutch East Indies.....	do.....	783		833				
Outer posses- sions.....								
Estimated total excluding Rus- sia <sup>4</sup> .....		76,400						
Oceania:								
Australia.....	December <sup>7</sup> .....	918	1,128	989	878	910	1,018	
New Zealand.....	January.....	396	473	520	587	557	488	
Estimated total <sup>4</sup> .....		1,400						
Total countries re- porting all pe- riods, including Russia:								
To 1930 (28) <sup>11</sup> .....		134,642	126,185	136,442	149,394	138,946	127,380	
To 1931 (15) <sup>12 13</sup> .....		100,801	92,128	100,228	110,130	103,204	100,829	
Estimated total including Russia <sup>4</sup> .....		256,300						105,563

Bureau of Agricultural Economics. Official estimates and International Institute of Agriculture unless otherwise stated.

<sup>1</sup> Average for 5-year period if available, otherwise for any year or years within that period unless otherwise stated.

<sup>2</sup> Incomplete.

<sup>3</sup> Census figure.

<sup>4</sup> These totals include interpolations for a few countries not reporting each year, and rough estimates for some others.

<sup>5</sup> Year 1920.

<sup>6</sup> Unofficial.

<sup>7</sup> Estimates reported as of December have been considered as of Jan. 1 of the following year; i. e., the figure for the number of swine in France as of Dec. 31, 1925, has been put in the 1926 column.

<sup>8</sup> Year 1922.

<sup>9</sup> June.

<sup>10</sup> Number in rural communities.

<sup>11</sup> September.

<sup>12</sup> May.

<sup>13</sup> Year 1916, from the Soviet Union Review, April, 1928, p. 52. Years 1924-1925, Statistical Review, October, 1928; 1926 Controlling Figures for National Economy of the U. S. S. R. 1929-1930; year, 1927, Agricultural Statistics of the U. S. S. R., Lenin Academy, 1928-30; Planned Economy No. 12, 1930 State Planning Board.

<sup>14</sup> Estimates for all China based on official estimate for 1920 in 20 provinces which supported over 50 per cent of the total in China in 1914.

<sup>15</sup> Comparable totals for the number of countries indicated.

<sup>16</sup> Excluding Russia.

TABLE 332.—*Hogs: Receipts at all public stockyards, 1922-1931*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>
1922.....	4,278	3,615	3,411	3,067	3,737	3,776	2,980	3,037	3,062	3,682	4,421	5,004	44,068
1923.....	5,306	4,492	4,927	4,318	4,524	4,204	4,181	3,714	3,607	4,816	5,416	5,825	55,330
1924.....	6,253	5,335	4,833	4,374	4,321	4,296	4,091	3,197	3,216	3,990	4,904	6,604	55,414
1925.....	6,105	4,558	3,528	3,267	3,283	3,507	2,798	2,549	2,741	3,390	3,343	4,380	45,929
1926.....	4,304	3,372	3,579	3,135	3,037	3,143	2,854	2,804	2,819	3,261	3,554	3,910	39,772
1927.....	4,252	3,308	3,754	3,142	3,613	3,775	3,046	3,042	2,565	3,039	3,666	4,209	41,411
1928.....	5,306	5,267	4,639	3,483	3,723	3,548	2,924	2,523	2,600	3,666	4,075	4,772	46,527
1929.....	5,133	4,000	3,436	3,582	3,431	3,275	3,297	2,964	3,089	3,701	3,933	4,256	44,097
1930.....	4,720	3,781	3,294	3,255	3,298	3,215	2,918	2,617	2,799	3,441	3,439	4,002	40,774
1931.....	4,652	3,704	3,207	3,067	2,938	2,854	2,511	2,454	2,727	3,462	3,752	4,210	39,538

Bureau of Agricultural Economics. Compiled from data of the livestock and meat reporting service of the bureau. Earlier data in 1930 Yearbook, p. 880, Table 376.

TABLE 333.—*Hogs: Receipts at principal public stockyards and all public stockyards, 1922-1931*

Year	Chi- cago	Den- ver	East St. Louis	Fort Worth	Kan- sas City	Oma- ha	St. Joseph	South St. Paul	Sioux City	Total 9 mar- kets <sup>1</sup>	All other stock- yards report- ing	Total all stock- yards re- port- ing <sup>1</sup>
	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>	<i>Thou- sands</i>
1922-----	3,156	395	3,006	510	2,655	2,839	2,061	2,523	1,856	24,601	19,467	44,068
1923-----	10,460	495	4,831	456	3,615	3,649	2,457	3,338	2,989	32,321	23,009	55,330
1924-----	10,443	569	4,580	392	2,933	3,978	2,234	3,751	3,732	32,613	22,801	55,414
1925-----	7,996	467	3,512	312	2,067	3,355	1,673	3,637	3,396	26,415	17,514	43,929
1926-----	7,093	497	3,536	217	2,036	2,647	1,462	3,451	2,475	23,413	16,359	39,772
1927-----	7,724	457	3,710	338	1,904	2,631	1,425	3,105	2,322	23,616	17,795	41,411
1928-----	8,539	567	4,036	432	2,391	3,179	1,724	2,902	2,754	26,525	20,002	46,527
1929-----	8,193	539	3,865	402	2,476	3,166	1,627	2,869	2,313	25,460	18,647	44,097
1930-----	7,870	512	3,459	279	2,015	3,363	1,446	2,759	2,317	24,021	16,753	40,774
1931-----	7,942	597	2,970	216	1,337	3,525	1,322	3,251	2,646	23,805	15,733	39,538

Bureau of Agricultural Economics. Compiled from data of the livestock and meat reporting service of the bureau. Receipts, 1900-1920, are available in 1924 Yearbook, p. 902, Table 500.

<sup>1</sup> Rounded totals of complete figures.

TABLE 334.—*Hogs: Monthly average live weight, Chicago, 1922-23 to 1931-32*

Year be- ginning October	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Aver- age Oct.- Mar. <sup>1</sup>	Apr.	May	June	July	Aug.	Sept.	Aver- age Apr.- Sept. <sup>1</sup>
	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>
1922-23-----	243	231	234	239	241	247	239	249	242	242	250	253	254	248
1923-24-----	247	234	231	227	229	237	234	239	239	241	251	255	254	246
1924-25-----	235	220	214	220	222	229	223	235	236	238	249	256	253	244
1925-26-----	242	228	225	231	235	245	234	244	247	255	271	281	267	261
1926-27-----	232	217	220	226	229	240	227	239	243	248	257	265	261	252
1927-28-----	235	215	217	225	230	235	226	233	234	239	251	257	251	244
1928-29-----	247	238	231	228	228	238	235	241	239	247	257	265	269	251
1929-30-----	242	223	224	228	231	235	230	234	238	245	257	255	244	246
1930-31-----	227	221	226	235	237	242	231	240	240	251	258	260	240	248
1931-32-----	222	217	223	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Livestock and meat reporting service. Weighted average of packer and shipper purchases. Data for 1900-1922 are available in 1924 Yearbook, p. 909, Table 506.

<sup>1</sup> Simple average.

TABLE 335.—*Hogs: Estimated average price per 100 pounds received by producers in the United States, 1922-23 to 1931-32*

Year beginning October	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Weight- ed aver- age
	<i>Dol- lars</i>	<i>Dol- lars</i>	<i>Dol- lars</i>	<i>Dol- lars</i>	<i>Dol- lars</i>	<i>Dol- lars</i>	<i>Dol- lars</i>	<i>Dol- lars</i>	<i>Dol- lars</i>	<i>Dol- lars</i>	<i>Dol- lars</i>	<i>Dol- lars</i>	<i>Dol- lars</i>
1922-23-----	8.33	7.78	7.63	7.77	7.65	7.52	7.45	7.13	6.87	6.68	6.85	7.81	7.41
1923-24-----	7.23	6.66	6.39	6.59	6.54	6.68	6.70	6.68	6.55	6.60	6.54	6.50	6.65
1924-25-----	9.45	8.62	8.39	8.21	8.62	11.83	11.64	10.78	10.82	12.02	12.19	11.50	10.16
1925-26-----	11.16	10.66	10.51	10.99	11.76	11.65	11.49	11.97	12.80	12.69	11.66	12.07	11.55
1926-27-----	12.06	11.45	10.97	10.97	11.19	10.89	10.41	9.41	8.40	8.59	9.24	9.78	10.28
1927-28-----	10.16	8.99	8.14	7.81	7.62	7.48	7.75	8.82	8.70	9.64	10.01	11.17	8.59
1928-29-----	9.55	8.51	7.93	8.18	8.88	10.00	10.20	9.96	8.90	10.35	10.28	9.53	9.28
1929-30-----	9.10	8.54	8.53	8.80	9.48	9.57	9.17	9.98	9.10	8.38	8.51	9.44	8.95
1930-31-----	8.79	8.20	7.44	7.25	6.81	6.92	6.92	6.35	5.70	6.20	6.25	6.44	6.95
1931-32-----	4.70	4.36	3.76	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by number of hogs Jan. 1, to obtain a price for the United States; yearly price obtained by weighting monthly prices by Federal inspected slaughter. For previous data see 1931 or earlier Yearbooks.

TABLE 336.—Hogs: Average price per 100 pounds at Chicago, by months, 1901–1931

Year beginning October	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Simple average
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1901----	6.10	5.65	5.95	6.20	6.10	6.35	6.95	7.00	7.35	7.65	7.15	7.55	6.67
1902----	7.00	6.30	6.20	6.40	6.75	7.30	7.20	6.45	6.00	5.55	5.45	5.55	6.37
1903----	5.55	4.65	4.45	4.90	5.15	5.35	5.10	4.65	5.05	5.40	5.30	5.75	5.11
1904----	5.40	4.80	4.50	4.65	4.85	5.15	5.45	5.40	5.35	5.65	5.95	6.50	5.22
1905----	5.25	4.85	4.90	5.40	6.00	6.30	6.55	6.45	6.55	6.65	6.25	6.25	5.65
1906----	6.40	6.20	6.25	6.60	7.05	6.65	6.65	6.40	6.10	6.05	6.00	6.00	6.56
1907----	6.15	4.90	4.70	4.40	4.45	5.00	5.85	5.50	5.80	6.50	6.55	6.85	5.65
1908----	5.95	5.80	5.65	6.10	6.35	6.70	7.20	7.30	7.65	7.85	7.75	8.20	6.88
1909----	7.75	8.00	8.35	8.55	9.05	10.55	9.90	9.55	9.45	8.75	8.35	8.90	8.93
1910----	8.50	7.60	7.65	7.95	7.40	6.85	6.25	6.00	6.25	6.70	7.30	6.90	7.11
1911----	6.45	6.30	6.40	6.25	6.20	7.10	7.80	7.65	7.50	7.65	8.25	8.45	7.17
1912----	8.75	7.75	7.40	7.45	8.15	8.90	9.05	8.55	8.65	9.05	8.35	8.30	8.36
1913----	8.20	7.75	7.70	8.30	8.60	8.70	8.65	8.45	8.20	8.75	9.00	8.85	8.42
1914----	7.65	7.50	7.10	6.90	6.80	6.75	7.30	7.00	7.60	7.25	6.90	7.25	7.22
1915----	7.90	6.65	6.40	7.20	8.20	9.65	9.75	9.85	9.70	9.80	10.30	10.70	8.84
1916----	9.80	9.60	9.95	10.90	12.45	14.80	15.75	15.90	15.50	15.20	16.90	18.20	13.75
1917----	17.15	17.40	16.85	16.30	16.65	17.10	17.45	17.45	16.60	17.75	19.00	19.65	17.45
1918----	17.70	17.70	17.55	17.60	17.65	19.10	20.40	20.60	20.40	21.85	20.00	17.45	19.00
1919----	14.35	14.20	13.60	14.97	14.55	14.94	14.79	14.28	14.68	14.84	14.74	15.88	14.65
1920----	14.17	11.83	9.65	9.41	9.42	10.00	8.50	8.35	8.19	9.69	9.26	7.61	9.66
1921----	7.72	7.01	6.92	8.02	9.90	10.43	10.31	10.48	10.33	9.70	8.51	8.75	9.01
1922----	8.80	8.07	8.18	8.29	8.02	8.18	8.08	7.58	6.92	7.04	7.65	8.35	7.93
1923----	7.42	6.85	6.87	7.10	7.06	7.35	7.36	7.34	7.04	7.68	9.38	9.57	7.58
1924----	9.01	8.97	9.38	10.38	12.06	13.55	12.55	12.00	12.57	13.46	12.06	12.52	11.59
1925----	11.31	11.28	10.97	12.02	12.45	12.20	12.33	13.55	14.01	12.61	11.48	12.08	12.18
1926----	12.72	11.80	11.67	11.96	11.73	11.28	10.69	9.59	8.78	9.05	9.03	10.22	10.70
1927----	10.39	8.92	8.32	8.25	8.08	8.08	9.28	9.07	9.91	10.65	11.53	11.89	9.58
1928----	9.57	8.83	8.61	9.22	10.19	11.44	11.41	10.81	10.72	11.20	10.52	9.85	10.20
1929----	9.38	9.06	9.34	9.78	10.67	10.17	10.00	10.02	9.52	8.73	9.58	9.76	9.67
1930----	9.34	8.55	7.93	7.65	7.06	7.46	7.20	6.53	6.36	6.33	5.98	5.41	7.15
1931----	5.00	4.61	4.20										

Bureau of Agricultural Economics. Monthly figures prior to 1920 are general average hog prices as published in the Chicago Drovers Journal Yearbook; subsequent figures compiled from reports of packer and shipper purchases; such purchases do not include pigs, boars, stags, extremely rough sows, or cripples. The yearly figures are the simple average of the October to September prices.

TABLE 337.—Hogs: Slaughter<sup>1</sup> under Federal inspection by months, 1922–1931

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>
1922----	3,985	3,480	3,350	2,946	3,716	4,046	3,104	2,888	2,747	3,332	4,318	5,201	43,114
1923----	5,134	4,231	5,838	4,179	4,325	4,303	3,983	3,559	3,212	4,328	5,341	5,904	53,334
1924----	5,911	5,006	4,536	4,073	4,278	4,288	4,114	3,070	2,857	3,498	4,041	6,000	52,873
1925----	5,979	4,147	3,299	3,037	3,186	3,732	2,819	2,453	2,598	3,314	3,646	4,533	43,043
1926----	4,501	3,351	3,502	3,105	3,131	3,430	3,127	2,834	2,616	2,976	3,610	4,394	40,636
1927----	4,514	3,395	3,637	3,330	3,766	4,253	3,431	3,050	2,534	2,969	3,688	4,809	43,633
1928----	5,479	5,780	5,140	3,440	3,894	4,078	2,984	2,545	2,508	3,713	4,465	5,782	49,795
1929----	5,738	4,478	3,645	3,761	3,798	3,756	3,597	3,130	3,104	3,857	4,409	5,083	48,445
1930----	5,001	4,034	3,392	3,480	3,823	3,689	3,187	2,724	2,773	3,492	4,024	4,647	44,206
1931----	5,362	4,142	3,523	3,488	3,408	3,251	2,767	2,500	2,955	3,772	4,218	5,387	44,772

Bureau of Animal Industry.

<sup>1</sup> The figures include condemned carcasses.

TABLE 338.—Hogs: Average price per 100 pounds at Chicago and Omaha, by months, July, 1930–December, 1931

CHICAGO									
Year and month	Butcher, bacon, and shipper hogs						Packing sows (275-500 lbs.) Medium and Good	Average cost, packer and shipper hogs	
	Light weight		Medium weight		Heavy weight				
	160-180 pounds Good and Choice	180-200 pounds Good and Choice	200-220 pounds Good and Choice	220-250 pounds Good and Choice	250-290 pounds Good and Choice	290-350 pounds Good and Choice			
1930	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars		
July.....	9.55	9.83	9.46	9.29	9.07	8.82	7.72	8.73	
August.....	10.58	10.62	10.56	10.42	10.14	9.78	8.35	9.58	
September.....	10.45	10.68	10.80	10.84	10.76	10.47	8.63	9.76	
October.....	9.53	9.63	9.72	9.81	9.83	9.72	8.28	9.34	
November.....	8.56	8.57	8.60	8.66	8.67	8.60	7.71	8.55	
December.....	8.16	8.13	8.06	7.97	7.89	7.78	7.02	7.92	
Average, 6 months.....	9.47	9.53	9.53	9.50	9.39	9.20	7.95	8.91	
1931									
January.....	8.11	8.08	7.94	7.70	7.44	7.22	6.50	7.65	
February.....	7.66	7.64	7.46	7.14	6.81	6.58	5.95	7.06	
March.....	7.94	7.94	7.88	7.63	7.36	7.10	6.43	7.46	
April.....	7.73	7.73	7.65	7.44	7.16	6.89	6.22	7.26	
May.....	6.90	6.89	6.85	6.70	6.49	6.23	5.50	6.53	
June.....	6.86	6.89	6.89	6.82	6.62	6.27	5.34	6.36	
July.....	7.53	7.63	7.61	7.55	6.81	6.08	4.99	6.33	
August.....	7.24	7.32	7.27	7.04	6.61	5.97	4.87	5.95	
September.....	5.80	5.96	6.05	6.02	5.88	5.49	4.65	5.41	
October.....	5.01	5.12	5.26	5.35	5.37	5.30	4.79	5.09	
November.....	4.63	4.67	4.69	4.70	4.69	4.64	4.22	4.61	
December.....	4.29	4.32	4.31	4.26	4.23	4.16	3.69	4.20	
Average.....	6.64	6.68	6.65	6.51	6.29	5.99	5.26	6.16	
OMAHA									
1930	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	
July.....	8.92	8.93	8.94	8.83	8.61	8.39	7.44	8.27	
August.....	9.96	10.04	10.04	9.99	9.60	9.14	8.15	8.87	
September.....	9.80	10.09	10.28	10.26	10.10	9.65	8.21	9.08	
October.....	8.92	9.19	9.31	9.30	9.23	8.99	7.88	8.80	
November.....	8.04	8.18	8.27	8.28	8.28	8.10	7.40	8.13	
December.....	7.73	7.78	7.78	7.75	7.70	7.55	6.72	7.60	
Average, 6 months.....	8.90	9.04	9.10	9.05	8.92	8.64	7.61	8.42	
1931									
January.....	7.66	7.62	7.54	7.40	7.20	6.99	6.17	7.33	
February.....	7.09	7.05	6.92	6.70	6.46	6.23	5.58	6.58	
March.....	7.31	7.34	7.33	7.21	7.05	6.84	6.14	7.02	
April.....	7.20	7.21	7.17	7.03	6.82	6.56	5.94	6.80	
May.....	6.38	6.38	6.34	6.19	5.95	5.65	4.97	5.93	
June.....	6.46	6.48	6.46	6.35	6.08	5.80	5.06	5.98	
July.....	7.03	7.03	7.05	6.84	6.00	5.60	4.79	5.81	
August.....	6.65	6.66	6.62	6.25	5.55	5.11	4.56	5.20	
September.....	5.43	5.56	5.56	5.50	5.12	4.70	4.10	4.77	
October.....	4.75	4.92	4.94	4.94	4.88	4.74	4.32	4.65	
November.....	4.31	4.39	4.41	4.40	4.39	4.38	4.06	4.20	
December.....	3.87	3.93	3.92	3.91	3.88	3.86	3.55	3.84	
Average.....	6.18	6.21	6.19	6.04	5.78	5.53	4.94	5.73	

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-producing service of the bureau. Earlier data in 1927 Yearbook, pp. 1012-1014 and in 1931 Yearbook, p. 852.

TABLE 339.—Hogs: Slaughter in specified countries, 1921-1931

Year	United States, Federal inspected	Canada, total	Germany, inspected slaughter	Denmark, in export slaughter houses	England and Wales, sold off farms for slaughter <sup>1</sup>	Scotland, sold off farms for slaughter <sup>1</sup>	Ireland, purchased by Irish bacon curers	Netherlands, receipts at 21 markets
	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands
1921.....	38,982	5,297	6,825	1,641	3,471	173	1,030	1,362
1922.....	43,114	5,382	6,923	2,215	3,229	176	926	865
1923.....	63,334	6,066	5,830	3,414	3,601	245	955	906
1924.....	62,873	6,025	10,527	4,024	4,500	242	1,110	1,008
1925.....	43,043	5,720	12,090	3,766	3,588	-----	911	1,045
1926.....	40,636	5,636	13,072	3,858	3,774	-----	910	1,025
1927.....	43,693	5,965	17,279	5,098	3,680	-----	1,050	1,151
1928.....	40,795	5,890	19,391	5,373	3,109	-----	1,264	1,068
1929.....	48,445	5,747	17,252	4,994	3,244	-----	1,142	1,046
1930.....	44,266	5,248	17,094	6,132	3,219	-----	1,037	-----
1931.....	44,772	( <sup>1</sup> )	20,488	7,343	-----	-----	1,102	-----

Bureau of Agricultural Economics. Compiled from official sources and cabled reports from agricultural representatives abroad.

<sup>1</sup> For years ended May 31 following.

<sup>2</sup> Inspected slaughter, only, was estimated at 2,234,000 in 1931 compared with 2,194,000 in 1930.

TABLE 340.—Lard and pork: Stocks in cold-storage warehouses and meat-packing establishments, United States, 1922-1931<sup>1</sup>

Product and year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
<b>Lard:</b>												
1922.....	47,541	61,202	61,207	66,031	96,056	123,798	154,254	143,084	119,766	75,338	39,750	32,506
1923.....	48,404	56,266	59,101	66,743	85,251	84,530	123,806	143,879	115,960	72,008	35,228	35,327
1924.....	40,340	54,130	68,610	85,722	102,317	127,949	152,620	149,672	124,676	84,198	31,709	35,713
1925.....	61,049	112,704	151,927	150,182	151,499	138,295	145,919	145,024	114,724	71,626	37,256	38,710
1926.....	42,478	64,187	76,145	93,108	98,365	106,824	120,527	135,672	151,233	105,558	72,355	46,744
1927.....	49,992	69,507	77,103	92,069	99,611	111,976	147,318	170,136	167,018	118,174	72,121	44,154
1928.....	54,855	84,007	121,082	164,506	173,088	186,073	214,479	204,639	177,888	126,890	83,474	67,287
1929.....	85,217	140,526	173,864	179,428	184,748	183,400	190,690	203,010	180,085	153,690	99,845	68,517
1930.....	82,098	92,171	111,914	105,067	104,006	115,270	120,323	118,353	88,868	59,732	36,211	31,582
1931.....	51,434	62,024	74,977	78,249	95,693	103,366	115,561	121,926	96,047	69,296	39,766	34,824
<b>Dry salt cured and in process of cure:</b>												
1922.....	111,071	128,690	139,281	145,183	142,030	157,689	186,948	179,856	165,668	122,783	85,671	83,017
1923.....	121,126	155,922	178,024	200,429	227,728	214,453	217,862	221,716	191,711	146,974	108,850	110,824
1924.....	148,121	167,507	178,288	192,934	191,882	206,009	212,158	203,618	180,127	135,702	81,460	78,871
1925.....	118,718	136,125	160,819	142,950	145,748	142,292	162,618	164,374	152,555	128,599	106,011	96,746
1926.....	119,617	138,058	144,071	151,288	140,324	136,801	148,164	164,388	172,766	143,572	98,521	66,765
1927.....	68,203	86,135	101,156	124,676	120,637	143,143	173,258	185,920	178,107	140,420	102,922	77,240
1928.....	97,335	119,751	160,669	178,013	173,652	169,663	174,906	164,473	156,482	125,899	101,123	102,440
1929.....	143,011	167,861	179,776	178,595	185,880	170,140	163,805	172,308	160,519	139,256	111,092	88,792
1930.....	107,789	116,288	123,740	115,653	110,303	105,913	108,171	114,998	97,237	71,143	43,194	48,931
1931.....	70,188	108,394	129,278	141,225	147,995	148,682	154,949	168,506	153,507	116,180	79,453	63,121
<b>Pickled,<sup>2</sup> cured, and in process of cure:</b>												
1922.....	262,822	264,487	321,860	347,276	348,305	363,395	391,474	385,092	369,187	313,517	273,812	302,708
1923.....	377,107	412,808	451,279	469,130	499,119	483,673	473,599	449,441	413,798	367,374	325,456	384,604
1924.....	424,926	469,892	500,784	512,190	530,683	493,372	473,914	443,918	406,926	351,485	285,710	299,908
1925.....	393,821	443,025	483,302	468,097	467,395	425,481	407,610	373,227	338,156	284,483	256,684	261,128
1926.....	26,642	319,720	345,061	346,049	338,908	330,305	335,305	350,340	367,330	326,093	106,257	726,266
1927.....	300,904	362,081	392,042	420,037	435,967	432,965	450,172	440,744	407,239	341,450	289,573	276,916
1928.....	320,436	370,916	461,264	496,322	480,009	450,878	454,526	468,934	451,898	385,295	300,885	292,626
1929.....	375,217	424,921	473,916	453,612	453,808	443,044	430,317	412,849	382,754	323,038	240,400	316,180
1930.....	368,126	392,123	443,883	430,926	411,705	392,403	396,810	380,182	339,070	282,979	209,448	285,636
1931.....	328,010	402,448	463,042	431,920	453,088	434,324	403,008	362,423	311,985	277,143	247,966	264,205
<b>Frozen:</b>												
1922.....	51,203	71,722	86,219	98,765	103,007	114,571	128,962	117,903	84,815	46,796	30,688	33,774
1923.....	72,278	120,196	154,377	189,115	213,224	210,645	217,074	196,002	148,753	98,795	71,640	82,068
1924.....	126,718	164,491	190,044	227,284	215,787	201,728	186,566	164,049	121,816	77,986	42,561	48,781
1925.....	130,125	199,621	234,211	284,215	308,001	246,180	245,168	237,131	93,635	53,078	54,264	29,019
1926.....	57,960	98,311	120,115	129,259	124,599	117,366	120,707	133,104	119,994	77,673	49,374	55,241
1927.....	97,050	150,255	177,876	193,733	204,608	211,742	220,847	214,607	181,073	126,887	76,644	65,666
1928.....	105,654	164,971	204,043	223,408	206,951	209,825	205,628	245,714	173,617	108,879	66,949	66,696
1929.....	151,811	245,798	291,050	289,754	285,110	256,291	247,615	229,397	176,131	119,204	75,010	84,667
1930.....	145,078	178,695	217,942	206,417	189,692	176,851	174,240	157,167	124,648	92,305	64,127	77,137
1931.....	122,994	215,422	271,088	270,520	266,491	244,745	215,794	180,883	129,571	81,559	53,456	69,237

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

<sup>1</sup> Lard includes all prime steam, kettle-rendered, neutral, and other pure lards. It does not include lard substitutes nor compounds.

<sup>2</sup> Pickled pork includes sweet-pickled, plain-brine, and barreled pork.

TABLE 341.—*Pork and pork products: International trade, average 1925-1929, annual 1928-1930*

Country	Calendar year							
	Average 1925-1929		1928		1929		1930 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
<b>PRINCIPAL EXPORTING COUNTRIES</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
United States.....	1,138,856	10,459	1,101,068	12,866	1,208,089	8,514	919,730	4,655
Denmark.....	557,264	2,899	650,462	2,713	596,417	2,695	738,218	2,784
Netherlands.....	249,396	15,089	274,177	15,623	202,634	8,166	210,205	5,225
Irish Free State.....	92,656	55,011	115,957	48,509	95,774	50,579	81,312	55,661
Canada.....	90,757	17,247	53,357	15,227	40,462	21,962	20,651	21,398
Sweden.....	41,205	9,796	51,426	6,863	44,603	7,804	63,900	6,591
Poland.....	40,987	37,151	46,937	57,292	21,962	44,420	17,124	30,805
Hungary.....	26,512	84	10,605	85	14,074	3	21,833	0
New Zealand.....	13,177	35	18,893	6	19,788	5	16,846	2
China.....	12,824	413	10,089	442	12,020	343	10,586	278
Argentina.....	9,319	42	10,874	40	13,456	32	12,403	31
Australia <sup>2</sup> .....	3,374	2,119	3,052	3,181	3,219	3,115	3,375	820
<b>Total.....</b>	<b>2,274,327</b>	<b>150,315</b>	<b>2,347,847</b>	<b>162,847</b>	<b>2,272,588</b>	<b>147,748</b>	<b>2,146,363</b>	<b>128,259</b>
<b>PRINCIPAL IMPORTING COUNTRIES</b>								
United Kingdom.....	5,883	1,371,607	6,256	1,431,846	5,432	1,306,908	5,102	1,477,216
Germany.....	4,684	322,127	4,832	240,873	6,168	275,581	13,735	237,707
Cuba.....	0	130,313	0	130,418	0	123,812	0	101,265
France.....	3,135	88,097	3,229	101,621	1,739	57,966	1,602	79,799
Czechoslovakia.....	4,018	31,017	3,263	71,629	4,502	84,792	2,573	60,435
Mexico.....	<sup>3</sup> 14	45,127	8	63,841		676	5	77,390
Austria.....	673	38,382	404	31,093	280	39,304	316	23,337
Belgium.....	7,184	22,099	6,810	19,935	3,932	35,807	3,087	34,592
Italy.....	3,212	16,850	1,108	30,147	1,179	28,812	2,059	11,055
Finland.....	379	12,024	181	13,865	390	11,352	751	7,271
Peru.....	6	11,692	0	9,405	10	9,464		
Norway.....	17	8,285	4	8,298	58	6,734		3,817
Philippine Islands.....	0	7,015	0	7,359	0	8,203	0	6,810
Switzerland.....	188	6,765	37	6,496	30	7,528	21	4,913
Brazil.....	940	2,569	1,928	636	1,608	682	1,712	888
Spain.....	1,303	2,484	761	3,561	892	4,479	2,951	540
Union of South Africa.....	747	1,398	617	1,476	635	1,482	618	1,175
Chile.....	<sup>3</sup> 199	473	94	264	437	181		
<b>Total.....</b>	<b>32,982</b>	<b>2,163,324</b>	<b>29,532</b>	<b>2,172,953</b>	<b>27,523</b>	<b>2,093,663</b>	<b>34,532</b>	<b>2,128,210</b>

Bureau of Agricultural Economics. Official sources except where otherwise noted. These figures comprise: Pork fresh, canned, pickled, smoked, bacon, Cumberland sides, Wiltshire sides, hams and shoulders, lard, lard compound, neutral lard, hog casings, lard oil, heads and feet.

<sup>1</sup> Preliminary.

<sup>2</sup> Year ended June 30.

<sup>3</sup> 4-year average.

TABLE 342.—*Lard: International trade, average 1925-1929, annual 1927-1930*

Country	Calendar year									
	Average 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
<b>PRINCIPAL EXPORTING COUNTRIES</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
United States.....	731, 029	0	681, 303	0	750, 722	0	829, 329	0	642, 456	0
Netherlands.....	64, 093	6, 748	74, 652	9, 028	65, 244	11, 619	49, 112	4, 727	39, 619	2, 831
Denmark.....	25, 954	1, 383	20, 213	1, 350	30, 851	1, 315	28, 434	1, 288	38, 102	1, 376
China.....	10, 672	0	8, 650	0	8, 229	0	9, 880	0	8, 468	0
Hungary.....	9, 018	15	9, 932	2	3, 785	69	2, 863	0	9, 183	0
Canada.....	4, 020	1, 462	4, 845	780	1, 008	1, 183	1, 504	297	176	1, 656
Irish Free State.....	3, 852	699	3, 921	609	4, 491	625	3, 794	879	6, 170	2, 198
Madagascar.....	1, 098	2	1, 180	2	2, 140	6	1, 353	1	1, 514	0
Australia <sup>2</sup> .....	1, 550	413	1, 316	575	1, 860	712	1, 599	421	970	206
<b>Total.....</b>	<b>853, 986</b>	<b>10, 722</b>	<b>815, 021</b>	<b>13, 205</b>	<b>876, 825</b>	<b>15, 529</b>	<b>927, 868</b>	<b>7, 583</b>	<b>746, 677</b>	<b>8, 267</b>
<b>PRINCIPAL IMPORTING COUNTRIES</b>										
United Kingdom.....	912	267, 191	878	267, 501	959	272, 460	524	292, 691	739	279, 444
Germany.....	857	216, 043	705	213, 283	891	192, 056	493	212, 780	267	177, 180
Cuba.....	0	87, 352	0	87, 935	0	86, 885	0	81, 025	0	69, 035
Czechoslovakia.....	52	60, 159	6	62, 354	12	60, 247	2	66, 400	8	52, 630
Austria.....	672	33, 151	006	27, 474	403	30, 839	280	30, 086	25	22, 394
France.....	500	32, 856	394	48, 750	359	29, 278	465	28, 302	494	17, 443
Poland.....	47	30, 326	11	33, 443	109	44, 601	31	35, 143	22	26, 549
Belgium.....	2, 295	16, 257	2, 974	16, 034	2, 049	14, 168	3, 379	19, 288	1, 947	13, 984
Porto.....	6	11, 692	18	11, 990	0	9, 406	10	9, 464	0	5, 324
Italy.....	820	7, 523	726	4, 801	156	11, 651	250	11, 002	256	5, 277
Finland.....	54	6, 758	0	6, 113	0	7, 837	0	6, 284	0	3, 908
Switzerland.....	21	6, 031	15	5, 818	14	5, 638	13	6, 783	10	4, 058
Dominican Republic.....	0	4, 883	0	4, 483	0	5, 373	0	6, 294	0	4, 706
Philippine Islands.....	0	4, 790	0	5, 225	0	4, 806	0	5, 850	0	2, 398
British Malaya.....	1, 151	3, 832	1, 071	3, 517	1, 340	4, 083	824	3, 526	815	2, 590
Sweden.....	1, 327	2, 843	2, 403	2, 080	1, 001	2, 381	1, 339	2, 182	2, 560	1, 602
Brazil.....	231	2, 912	175	232	45	335	856	372	988	654
Norway.....	1	1, 945	1	2, 092	0	1, 777	0	1, 496	0	1, 173
Yugoslavia.....	936	1, 501	1, 540	142	88	677	15	3, 280	262	201
<b>Total.....</b>	<b>9, 792</b>	<b>804, 054</b>	<b>11, 823</b>	<b>808, 360</b>	<b>8, 032</b>	<b>785, 497</b>	<b>8, 480</b>	<b>832, 166</b>	<b>8, 391</b>	<b>687, 901</b>

Bureau of Agricultural Economics. Official sources.

<sup>1</sup> Preliminary.<sup>2</sup> Year ended June 30.<sup>3</sup> Includes oleomargarine.TABLE 343.—*Lard, refined: Average price per 100 pounds, Chicago, by months, 1922-1931*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1922.....	11.19	12.59	13.50	12.62	13.15	13.22	13.06	13.30	13.00	14.12	13.78	13.31	13.07
1923.....	13.20	13.25	13.87	13.42	13.12	13.18	12.84	12.83	15.06	15.22	15.72	15.04	13.90
1924.....	14.52	13.03	12.84	12.50	12.19	12.13	13.65	15.94	10.25	18.05	16.68	18.00	14.65
1925.....	17.59	17.03	18.25	17.07	16.50	18.13	18.42	18.94	18.95	18.75	18.50	16.67	17.90
1926.....	16.81	16.44	16.70	16.75	17.13	18.48	18.00	17.38	17.60	16.75	15.75	15.25	16.91
1927.....	13.59	13.72	14.38	14.32	14.12	13.35	12.25	12.54	14.25	14.50	13.60	13.25	13.66
1928.....	12.50	11.60	11.50	12.50	13.10	13.50	14.00	14.70	15.25	14.40	13.62	12.88	13.30
1929.....	12.75	12.75	13.31	13.25	12.85	12.85	13.22	13.56	13.81	13.17	12.21	11.94	12.97
1930.....	11.45	12.38	12.12	11.65	11.50	11.00	10.50	12.44	14.25	13.94	12.31	10.70	12.02
1931.....	9.62	8.94	10.00	10.00	9.50	9.53	8.05	8.32	9.00	8.58	8.47	7.65	9.02

Bureau of Agricultural Economics. Compiled from data of the livestock and meat reporting service of the bureau. Beginning January, 1927, prices represent refined lard in hardwood tubs, earlier prices represent pure lard in trolcos. Prices 1905 to December, 1921, available in 1927 Yearbook, p. 1018.

TABLE 344.—*Lard, American prime western steam: Average price per pound, in tierces, at Liverpool, 1921-1931*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1922.....	11.3	12.9	13.1	12.8	13.6	13.5	13.2	13.3	12.7	13.2	14.1	13.6	13.1
1923.....	13.3	13.0	13.7	13.6	12.9	13.0	12.7	12.7	14.0	14.5	15.7	15.1	13.7
1924.....	14.8	13.1	12.8	12.7	12.3	12.2	13.7	15.8	15.8	18.1	17.2	18.1	14.7
1925.....	18.0	17.5	18.7	17.8	17.6	19.1	19.8	19.2	19.2	17.9	17.8	16.6	18.2
1926.....	17.2	16.5	16.5	16.0	17.6	18.4	17.8	17.0	16.6	15.8	14.2	14.3	16.6
1927.....	14.3	14.4	14.4	14.3	14.1	14.4	14.3	13.8	14.6	14.4	14.0	13.6	14.2
1928.....	13.6	12.9	13.0	13.3	13.4	13.3	13.7	13.9	14.4	13.9	12.4	13.2	13.5
1929.....	13.4	13.5	13.9	13.5	13.4	13.5	13.9	13.8	13.6	12.7	12.1	11.8	13.2
1930.....	11.9	12.2	11.8	11.8	11.8	11.3	11.2	12.3	13.2	13.2	12.5	11.3	12.0
1931.....		9.8	10.5	10.3	9.5	10.0	9.5	8.8	8.7	9.0	8.2	7.3	10.2

Bureau of Agricultural Economics. Compiled from Manchester Guardian. An average of Friday quotations. Converted at monthly average rate of exchange as given in Federal Reserve Bulletins to 1925, inclusive; subsequently at par of exchange.

<sup>1</sup> 2 quotations only.

<sup>2</sup> Average for 11 months.

TABLE 345.—*Bacon, Wiltshire sides,<sup>1</sup> green, firsts: Average price per pound at Bristol, England, 1909-1931*

Year	American	Danish	Irish	British	Year	American	Danish	Irish	British
	Cents	Cents	Cents	Cents		Cents	Cents	Cents	Cents
1909.....	13.6	15.0	15.9	16.7	1921.....	21.8	32.8	34.7	36.2
1910.....	15.2	15.9	16.6	17.8	1922.....	21.2	29.7	32.5	33.3
1911.....	12.8	14.3	14.8	15.8	1923.....	17.5	23.6	25.8	27.0
1912.....	13.8	15.9	15.8	16.3	1924.....	18.6	21.3	22.8	23.5
1913.....	15.8	17.1	17.4	18.4	1925.....	23.0	27.5	29.7	30.0
1914.....	15.5	16.4	17.6	18.2	1926.....	<sup>2</sup> 23.5	27.8	30.6	32.3
1915.....	17.0	20.4	20.8	21.4	1927.....	<sup>3</sup> 17.8	21.1	25.5	26.9
1916.....	19.8	24.0	24.7	26.0	1928.....	17.9	21.2	23.7	25.8
1917.....	30.1		33.0	33.6	1929.....	<sup>4</sup> 21.9	24.5	26.6	28.3
1918.....	38.5			30.3	1930.....	19.3	20.8	25.1	27.6
1919.....	37.1		38.4	38.4	1931.....	13.9	13.1	18.7	19.5
1920.....	31.6	34.2	41.7	42.8					

Bureau of Agricultural Economics. Compiled from Agricultural Market Report, Ministry of Agriculture and Fisheries, Great Britain. Average for the last week of each month 1909-1920. Average of weekly averages 1924-1931. Converted at monthly average rate of exchange as given in Federal Reserve Bulletins to December, 1925, inclusive; subsequently at par of exchange. Prices of Canadian bacon are given for the years 1909-1925 in Table 393, 1931 Yearbook; these prices have not been quoted for later years by the Ministry of Agriculture and Fisheries.

<sup>1</sup> Entire half of hog in one piece, head off, back bone out, ribs in.

<sup>2</sup> Average for 11 months.

<sup>3</sup> Average for 5 months.

<sup>4</sup> Average for 9 months.

TABLE 346.—*Hogs: Cholera-control work by Bureau of Animal Industry, 1918-19 to 1930-31*

Year beginning July	Bureau veterinarians engaged in work <sup>1</sup>	Premises investigated	Demonstrations		Autopsies performed	Farms quarantined or carded	Farms cleaned and disinfectd	Outbreaks reported
			Number	Hogs treated				
1918-19.....	180	93, 512		233, 987	53, 586	9, 564	4, 382	12, 336
1919-20.....	140	45, 145	3, 037	347, 702	10, 963	6, 129	2, 099	9, 788
1920-21.....	54	29, 433	3, 420	67, 295	3, 888	2, 268	658	7, 951
1921-22.....	90	47, 137	4, 343	88, 846	5, 390	1, 401	439	7, 920
1922-23.....	71	52, 848	5, 234	108, 562	5, 247	1, 772	741	7, 204
1923-24.....	45	29, 443	3, 178	78, 007	3, 686	1, 634	847	7, 225
1924-25.....	34	24, 050	2, 353	51, 331	2, 383	886	470	3, 437
1925-26.....	35	20, 899	2, 579	69, 230	2, 446	854	247	4, 558
1926-27.....	36.86	25, 004	4, 593	97, 917	3, 741	1, 832	744	11, 555
1927-28.....	38.42	25, 156	4, 444	105, 906	3, 363	1, 117	522	6, 941
1928-29.....	37.41	28, 939	2, 645	55, 023	3, 323	1, 431	489	7, 029
1929-30.....	36.5	26, 858	1, 740	35, 153	2, 505	872	345	4, 162
1930-31.....	35.43	23, 226	1, 460	29, 152	2, 011	677	380	3, 388

Bureau of Animal Industry.

<sup>1</sup> Fractions in the number of veterinarians engaged denote part time devoted to hog-cholera-control work.

TABLE 347.—Hogs: Shipments, slaughter, value of production and income, by States, 1930

State and division	Shipments and local slaughter		Inshipments, stocker, feeding and breeding		Farm slaughter		Value of amount consumed on farms	Receipts from sales	Gross income	Value of production
	Head	Total weight	Head	Total weight	Head	Total weight				
	Thous- ands	1,000 pounds	Thous- ands	1,000 pounds	Thous- ands	1,000 pounds	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars
Maine.....	28	7,280	1	100	31	8,370	427	1,249	1,676	1,502
New Hampshire.....	13	3,390	2	200	12	3,240	143	507	650	551
Vermont.....	12	3,120	—	—	36	9,360	423	919	1,342	1,147
Massachusetts.....	90	23,400	11	1,100	27	7,020	337	2,562	2,899	2,704
Rhode Island.....	6	1,500	—	—	4	1,000	55	237	292	264
Connecticut.....	12	3,120	—	—	20	5,200	289	681	970	898
New York.....	112	25,760	2	200	205	48,790	2,603	5,246	7,849	6,577
New Jersey.....	61	12,200	27	3,375	45	10,350	663	1,427	2,090	2,013
Pennsylvania.....	335	77,050	3	300	450	112,500	7,688	12,747	20,435	18,740
North Atlantic.....	669	156,810	46	5,275	830	205,830	12,628	25,575	38,203	34,396
Ohio.....	2,171	488,475	8	880	670	167,500	13,698	48,462	62,180	59,580
Indiana.....	3,348	770,040	16	1,920	550	137,500	12,020	78,351	85,371	82,929
Illinois.....	5,152	1,231,848	28	3,220	620	155,000	12,694	113,591	126,285	125,830
Michigan.....	618	126,690	17	1,700	260	62,400	3,691	13,932	17,623	15,792
Wisconsin.....	1,880	423,000	1	100	460	103,500	7,203	39,132	46,335	46,449
North Central, East.....	13,160	3,040,063	70	7,820	2,560	625,900	49,306	288,488	387,794	330,580
Minnesota.....	4,676	1,028,720	36	3,600	410	90,200	6,748	90,561	97,309	97,799
Iowa.....	12,161	2,858,485	81	9,315	501	115,230	9,824	247,999	257,823	265,074
Missouri.....	4,087	919,575	31	3,410	813	199,185	15,950	82,623	98,573	95,392
North Dakota.....	790	181,700	1	100	210	46,200	3,322	14,771	18,093	18,518
South Dakota.....	3,230	742,900	8	920	160	37,600	3,000	62,518	65,518	66,846
Nebraska.....	5,468	1,388,872	25	2,500	282	71,628	6,045	120,820	126,865	127,779
Kansas.....	3,100	698,625	46	5,280	374	93,500	7,052	61,083	69,335	68,043
North Central, West.....	33,512	7,818,877	228	25,135	2,750	653,543	52,541	680,975	733,516	739,451
North Central.....	46,681	10,858,930	268	32,955	5,310	1,279,443	101,847	960,463	1,071,310	1,070,031
Delaware.....	23	4,370	—	—	15	3,000	185	594	779	724
Maryland.....	110	17,600	—	—	140	33,600	2,749	2,616	5,365	4,916
Virginia.....	182	32,180	1	100	494	111,150	8,303	5,097	13,400	12,291
West Virginia.....	105	17,750	1	100	192	48,000	3,640	2,951	6,591	6,029
North Carolina.....	165	33,000	—	—	769	169,180	14,812	6,797	21,609	21,242
South Carolina.....	80	16,000	—	—	377	81,055	6,857	2,009	8,866	8,632
Georgia.....	416	64,480	1	100	999	217,732	15,681	7,413	23,094	22,495
Florida.....	176	24,990	—	—	325	45,500	2,129	8,795	5,924	5,329
South Atlantic.....	1,227	210,370	8	300	3,311	709,267	54,356	31,272	85,628	81,658
Kentucky.....	450	80,375	12	900	580	145,000	11,480	9,449	20,029	18,873
Tennessee.....	357	74,540	13	1,625	615	153,750	11,638	8,855	20,491	18,991
Alabama.....	190	32,400	1	150	642	128,400	8,834	4,447	13,281	11,848
Mississippi.....	68	9,000	2	280	549	109,800	7,113	2,785	9,898	9,454
Arkansas.....	164	24,000	1	100	501	112,200	6,900	3,806	10,708	8,882
Louisiana.....	67	10,050	5	750	304	49,280	3,083	1,022	4,655	4,246
Oklahoma.....	727	147,400	12	1,200	365	91,250	7,033	12,555	19,588	18,241
Texas.....	657	138,575	12	1,200	700	197,600	13,737	13,269	27,008	24,927
South Central.....	2,678	517,840	58	6,205	4,380	997,280	69,706	56,788	126,554	115,467
Montana.....	235	47,000	—	—	124	27,280	1,825	4,885	6,710	6,331
Idaho.....	233	44,270	—	—	67	10,080	1,258	4,295	5,553	5,617
Wyoming.....	111	21,090	—	—	35	8,050	535	1,860	2,395	2,390
Colorado.....	602	113,875	5	500	96	23,040	1,663	10,299	11,962	12,167
New Mexico.....	41	8,200	—	—	31	6,200	407	756	1,163	1,063
Arizona.....	17	3,400	—	—	10	1,900	117	423	540	519
Utah.....	61	9,150	2	200	39	7,800	516	988	1,504	1,363
Nevada.....	27	4,980	1	100	15	3,000	224	498	722	739
Washington.....	146	30,990	18	1,800	109	23,980	1,329	4,221	5,550	5,112
Oregon.....	199	39,830	18	2,160	94	19,740	1,142	4,690	5,532	5,487
California.....	555	101,200	3	300	110	22,000	1,584	10,887	12,471	11,750
Western.....	2,127	423,985	47	5,060	730	159,070	10,600	43,802	54,402	52,473
United States.....	53,382	12,167,935	452	49,795	14,561	3,340,890	249,197	1,126,900	1,376,097	1,354,030

Bureau of Agricultural Economics. Estimates Division of Crop and Livestock Estimates. Subject to revision. For the five-year average 1924-28 see 1931 Yearbook Table 395. The figures on income and value of production as shown in Table 455 are computed from the data shown in this table. The difference between gross income and value of production arises from the fact that in computing value of production allowance is made for changes in inventory numbers at the beginning and end of the year while in computing income these changes are not used.

TABLE 348.—*Sheep and lambs: Number on farms and value per head in the United States, 1840, 1850, 1860, 1867-1932*

Year	Sheep on farms		Year	Sheep on farms	
	Number <sup>1</sup>	Value per head Jan. 1		Number <sup>1</sup>	Value per head Jan. 1
	Thou- sands	Dollars		Thou- sands	Dollars
1840 <sup>a</sup>	19,511		1900 <sup>a</sup>	41,883	
1850 <sup>a</sup>	21,723		1900 <sup>a</sup>	61,504	
1860 <sup>a</sup>	28,471		1900 <sup>a</sup>		2.93
1867	39,385	2.50	1901	46,155	2.98
1868	38,992	1.82	1902	46,667	2.65
1869	37,724	1.64	1903	45,180	2.63
1870 <sup>a</sup>	28,478		1904	42,439	2.59
1870	40,858	1.96	1905	40,268	2.82
1871	31,851	2.14	1906	42,454	3.54
1872	31,679	2.61	1907	44,518	3.84
1873	33,002	2.71	1908	43,557	3.88
1874	33,938	2.43	1909	48,382	3.43
1875	33,784	2.55	1910 <sup>a</sup>	52,148	
1876	35,935	2.37	1910	47,072	4.12
1877	35,804	2.13	1911	47,349	3.91
1878	35,740	2.21	1912	43,279	3.46
1879	38,124	2.07	1913	40,700	3.94
1880 <sup>a</sup>	36,122		1914	37,773	4.02
1880	40,766	2.21	1915	36,287	4.50
1881	43,570	2.39	1916	36,543	5.17
1882	45,016	2.37	1917	36,700	7.13
1883	49,237	2.53	1918	39,000	11.82
1884	50,627	2.37	1919	41,000	11.63
1885	50,360	2.14	1920 <sup>a</sup>	55,034	
1886	48,322	1.91	1920	40,643	10.45
1887	44,759	2.01	1921	36,378	6.27
1888	43,545	2.06	1922	36,821	4.79
1889	42,599	2.13	1923	36,695	7.49
1890 <sup>a</sup>	55,855		1924	37,020	7.88
1890	44,338	2.27	1925 <sup>a</sup>	55,590	
1891	43,431	2.50	1925	38,392	9.68
1892	44,938	2.58	1926	40,183	10.48
1893	47,274	2.66	1927	42,302	9.67
1894	45,048	1.98	1928	45,121	10.22
1895	42,294	1.58	1929	48,249	10.59
1896	38,299	1.70	1930 <sup>a</sup>	56,983	
1897	36,819	1.82	1930	51,383	8.94
1898	37,657	2.46	1931	52,745	5.35
1899	39,114	2.75	1932 <sup>a</sup>	53,912	3.40

Bureau of Agricultural Economics. Estimates of the crop reporting board. Revisions for the years 1920-1931 were made January, 1932.

<sup>1</sup> Prior to 1900 estimates for each 10-year period represent an index of annual changes applied to census as base on first report after census data were available. Figures for 1900-1919 are tentative revised estimates of the Bureau of Agricultural Economics as first published in 1927 Yearbook.

<sup>2</sup> Italic figures are from the census. Figures for census years 1860, 1880, and 1890 exclude an estimated number of unenumerated sheep on ranges, as follows: 1860, 1,505,810; 1880, 7,000,000; 1890, 4,940,948. Censuses prior to 1900 excluded lambs. Census dates were June 1 from 1840 to 1900; Apr. 15, 1910; Jan. 1, 1920 and 1925; and Apr. 1, 1930. 1900, 1910 and 1930 include spring-born lambs.

<sup>3</sup> Original estimate of the Bureau of Agricultural Economics.

<sup>4</sup> Preliminary.

TABLE 349.—*Sheep and lambs: Estimated number on farms and value per head, by States, January 1, 1928-1932*

State and division	Number					Value per head <sup>1</sup>				
	1928 <sup>2</sup>	1929 <sup>2</sup>	1930 <sup>2</sup>	1931 <sup>2</sup>	1932 <sup>2</sup>	1928	1929	1930	1931	1932
	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Thou-</i>	<i>Dol-</i>	<i>Dol-</i>	<i>Dol-</i>	<i>Dol-</i>	<i>Dol-</i>
	<i>sands</i>	<i>sands</i>	<i>sands</i>	<i>sands</i>	<i>sands</i>	<i>lars</i>	<i>lars</i>	<i>lars</i>	<i>lars</i>	<i>lars</i>
Maine.....	92	84	83	85	81	8.50	8.40	8.60	8.70	8.50
New Hampshire.....	21	19	20	19	18	9.50	9.60	9.40	6.20	4.50
Vermont.....	44	43	42	41	39	9.30	9.00	9.30	5.70	3.90
Massachusetts.....	11	11	12	11	10	10.60	10.00	9.90	7.30	4.50
Rhode Island.....	2	2	2	2	2	10.50	11.00	11.50	7.50	4.50
Connecticut.....	9	9	10	11	10	10.60	11.90	10.90	7.50	4.70
New York.....	516	518	520	489	473	11.10	11.40	10.50	6.20	4.40
New Jersey.....	6	7	7	8	7	12.20	11.50	11.60	7.50	5.40
Pennsylvania.....	437	441	467	481	491	9.50	9.60	9.60	5.90	4.40
North Atlantic.....	1,138	1,134	1,163	1,147	1,131	10.17	10.35	9.95	6.05	4.34
Ohio.....	2,005	2,005	2,105	2,000	2,164	8.90	9.00	8.50	4.60	3.50
Indiana.....	714	741	781	809	826	11.00	11.20	10.50	5.70	4.00
Illinois.....	630	680	709	719	799	10.60	10.80	10.00	5.90	3.80
Michigan.....	1,263	1,334	1,304	1,213	1,285	10.90	10.90	10.10	5.20	3.90
Wisconsin.....	444	459	517	529	546	10.20	10.40	9.00	5.30	3.20
North Central East.....	5,056	5,219	5,416	5,270	5,620	10.02	10.16	9.42	5.13	3.67
Minnesota.....	666	772	910	1,027	1,084	10.50	10.80	9.60	5.10	3.20
Iowa.....	983	1,085	1,230	1,313	1,398	10.80	11.00	9.90	5.50	3.30
Missouri.....	942	1,131	1,180	1,204	1,205	10.10	10.70	9.10	5.00	3.30
North Dakota.....	549	672	802	940	1,040	10.80	11.10	9.70	5.00	3.30
South Dakota.....	863	1,001	1,189	1,332	1,465	10.60	10.80	9.00	5.00	3.30
Nebraska.....	905	1,050	1,208	960	1,047	9.10	9.50	8.20	4.70	3.00
Kansas.....	512	632	659	669	779	9.30	9.20	8.40	4.50	3.10
North Central West.....	5,420	6,343	7,178	7,445	8,018	10.18	10.44	9.12	5.04	3.22
North Central.....	10,476	11,562	12,594	12,715	13,638	10.11	10.31	9.25	5.07	3.41
Delaware.....	3	3	4	4	4	12.00	11.50	11.80	7.00	5.00
Maryland.....	104	111	113	111	108	11.60	11.50	11.50	6.80	5.10
Virginia.....	437	468	490	495	485	11.50	11.80	11.00	6.70	4.60
West Virginia.....	536	574	601	625	657	11.10	11.40	9.90	5.80	4.40
North Carolina.....	85	94	88	90	91	9.10	9.10	8.70	5.80	3.90
South Carolina.....	15	15	14	14	14	4.90	4.90	4.90	4.00	3.70
Georgia.....	41	39	38	38	37	3.80	4.00	4.20	3.90	2.80
Florida.....	53	50	45	44	43	3.60	4.30	4.10	3.30	2.40
South Atlantic.....	1,274	1,354	1,398	1,421	1,439	10.53	10.84	9.96	6.08	4.35
Kentucky.....	895	910	915	875	875	11.20	11.40	10.40	6.50	4.70
Tennessee.....	345	352	364	382	393	9.70	9.30	9.60	5.80	4.00
Alabama.....	60	63	56	50	50	4.40	4.20	4.40	3.40	2.60
Mississippi.....	88	90	91	91	100	3.40	3.30	3.50	2.90	2.00
Arkansas.....	55	54	54	56	59	6.10	6.50	5.90	3.30	2.60
Louisiana.....	129	130	135	133	140	3.00	3.30	3.40	2.70	2.70
Oklahoma.....	130	160	185	174	164	8.60	9.90	8.90	4.00	3.00
Texas.....	5,047	5,703	6,387	6,834	7,312	8.40	8.80	7.10	4.20	2.90
South Central.....	9,749	7,471	8,187	8,595	9,093	8.62	8.96	7.49	4.45	3.11
Montana.....	3,400	3,354	4,120	4,214	3,820	11.10	11.40	9.40	5.10	3.20
Idaho.....	2,100	2,230	2,280	2,394	2,274	11.40	11.90	9.80	6.10	3.60
Wyoming.....	3,306	3,471	3,540	3,804	4,128	10.60	11.00	9.20	5.80	3.60
Colorado.....	3,020	3,118	3,750	3,351	3,361	9.60	10.60	9.00	5.60	3.10
New Mexico.....	2,390	2,385	2,527	2,780	3,058	9.00	10.40	8.10	4.90	2.30
Arizona.....	1,130	1,107	1,080	1,112	1,190	9.30	9.60	8.00	4.80	2.30
Utah.....	2,730	2,870	2,900	2,900	2,755	11.20	11.00	9.60	6.40	3.70
Nevada.....	1,234	1,172	1,088	1,175	1,152	11.00	10.80	9.20	6.30	4.00
Washington.....	645	700	735	750	750	11.60	12.10	9.70	6.20	4.00
Oregon.....	2,359	2,501	2,576	2,679	2,679	11.30	11.50	9.00	6.40	3.50
California.....	3,170	3,320	3,450	3,588	3,444	11.40	10.80	9.10	5.30	4.20
Western.....	25,484	26,728	28,046	28,887	28,611	10.68	11.16	9.13	5.68	3.40
United States.....	45,121	48,249	51,383	52,745	53,912	10.22	10.59	9.94	5.35	3.40

Bureau of Agricultural Economics. Estimates of crop-reporting board. Revisions by State, 1920-1927 are published in February, 1932, Crops and Markets.

<sup>1</sup> Sum of total value of classes divided by total number and rounded to nearest dime for States. Division and United States averages not rounded.

<sup>2</sup> Revised January, 1932.

<sup>3</sup> Preliminary.

TABLE 350.—*Sheep: Number in countries having 100,000 and over, average 1921-1925, annual 1926-1931*

Country	Month of estimate	Average 1921-1925 <sup>1</sup>	1926	1927	1928	1929	1930	1931
North America, Central America, and West Indies:		Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands
United States	January	37,662	40,183	42,302	45,121	48,249	51,343	52,745
Canada	June	3,027	3,142	3,703	3,416	3,636	3,606	
Mexico	do	<sup>2</sup> 1,362	2,698					
Guatemala		153	148	216	241	189	184	
Cuba						102		
Dominican Republic		148						
Estimated total <sup>3</sup>		42,700						
South America:								
Colombia		776	800	771			810	
Venezuela		113						
Ecuador		(1,000)	700			<sup>4</sup> 1,500		
Peru		11,363				<sup>4</sup> 11,209		
Bolivia	December <sup>5</sup>	3,436	4,200	4,151		<sup>6</sup> 5,552		
Chile		4,232	<sup>7</sup> 4,094				<sup>8</sup> 2,263	
Brazil	September	<sup>9</sup> 7,933						
Uruguay		<sup>10</sup> 14,443				<sup>4</sup> 19,358	<sup>5</sup> 20,558	
Paraguay	December <sup>6</sup>	(800)						
Argentina	do	<sup>11</sup> 36,206					<sup>12</sup> 44,413	
Falkland Islands		649	606	607	631	613		
Estimated total <sup>1</sup>		80,900						
Europe:								
Iceland		565	590	600	627	640		
England and Wales	June	14,385	16,859	17,072	16,300	16,105	16,816	17,745
Isle of Man	do	77	90	91	89	92	96	
Scotland	do	6,827	7,203	7,536	7,579	7,556	7,622	7,697
North Ireland	do	456	529	600	624	654	704	793
Irish Free State	do	2,504	3,003	3,120	3,264	3,375	3,515	3,575
Norway <sup>10</sup>	do	1,380	1,595	1,608	1,654	1,533	1,588	1,692
Sweden	June-September	1,384		706	806		652	
Denmark	July	380	233			193		
Faeroe Islands		66						
Netherlands	May-June	668					<sup>13</sup> 485	
Belgium	December <sup>6</sup>	126			<sup>4</sup> 129			
France	do	9,777	10,537	10,775	10,693	10,445	10,452	10,152
Spain	do	19,229	20,067	20,529		<sup>14</sup> 19,370		
Portugal	do	8,684		<sup>4</sup> 4,450	<sup>4</sup> 4,900	<sup>4</sup> 4,000		
Italy	March-April	12,014	<sup>4</sup> 12,350	<sup>4</sup> 12,500			<sup>15</sup> 9,896	
Switzerland	April	245	169					184
Germany	December <sup>6</sup>	5,889	4,763	4,080	3,819	3,635	<sup>16</sup> 3,480	3,501
Austria	do	526					<sup>17</sup> 272	
Czechoslovakia	do	<sup>18</sup> 986	861				<sup>11</sup> 881	608
Hungary	April	1,661	1,804	1,011	1,666	1,573	1,464	1,440
Yugoslavia	January	7,728	7,933	7,736	7,722	7,736		7,953
Greece	December <sup>6</sup>	5,965	6,636	6,951	6,442	6,920	5,806	
Bulgaria	do	8,186		<sup>19</sup> 8,739	8,427	7,986		
Rumania	do	11,660	12,950	13,116	12,555	12,423	12,062	11,921
Poland	November	2,193		1,918		2,523	2,490	2,594
Lithuania		1,314	1,573	1,410	1,368	1,125	1,067	
Latvia	June	1,240	1,163	1,128	1,090	906	873	923
Estonia	July	654	666	607	659	476	407	
Finland	September	1,526	1,414	1,368	1,319	1,310		
Russia (European and Asiatic) <sup>14</sup>	Summer	93,569	113,865	126,835	133,592	134,000	100,600	
Estimated total excluding Russia <sup>3</sup>		123,600						
Africa:								
Abyssinia (Ethiopia)		(2,000)				4,000		
Morocco		7,533	9,250	7,712	8,085	8,848	7,357	
Algeria	September	5,943	6,786	5,083	5,614	6,196	7,168	
Libia (Italian)		1,043			822			
Tunis	December <sup>6</sup>	1,794	1,829	2,142	2,142	2,178	2,461	2,976
French West Africa		3,742	4,365	3,968	5,341	5,113	7,458	
French Sudan		2,173		2,400	2,494	2,789	8,000	
Gold Coast		373	325	350	400	400		
Nigeria including British Cameroons		1,711	1,809	1,827	1,785	2,121	2,478	
Egypt	September	1,013	1,144	1,232	1,180	1,008	1,129	
Anglo-Egyptian Sudan		1,638	2,000	2,201	2,201	2,200	2,200	
British Somaliland		(2,000)	2,000	2,000	1,300	1,700	2,000	
Italian Somaliland	Mar. 31	1,666			<sup>1</sup> 1,089	855	847	

See footnotes at end of table.

TABLE 350.—*Sheep: Number in countries having 100,000 and over, average 1921-1925, annual 1926-1931—Continued*

Country	Month of estimate	Average 1921- 1925 <sup>1</sup>	1926	1927	1928	1929	1930	1931
		Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands
<b>Africa—Continued.</b>								
Eritrea (Italian) <sup>11</sup>		1,701		1,842	1,879			
Kenya Colony	March-June	2,600	2,756	2,805	2,847	2,905	3,228	
French Cameroon <sup>11</sup>		287	410	456	441	620	664	
Uganda	December <sup>6</sup>	386	604	860	911	967	806	792
Belgian Congo		304	300	285	270	348	369	
Ruanda Urundi		180	125	125	110	125		
British Southwest Africa		954	1,069	1,252	1,524	1,497	1,601	
Bechuanaland		125	132	152	152			
Union of South Africa	August	32,561	39,020	40,271	42,662	45,172	49,240	51,700
Basutoland		1,954	2,100	2,149	2,100	2,150	2,400	
Rhodesia, Southern	December <sup>6</sup>	333	849	332	332	359	354	
Tanganyika Territory <sup>12</sup>		3,893	4,462	4,779	5,082	5,041	5,522	
Madagascar		110	116	66	142	201	263	
Estimated total <sup>3</sup>		78,500						
<b>Asia:</b>								
Arabia		(3,500)		4,3,500				
Cyprus	March	237	207	260	264	273	200	
Turkey, European and Asia		10,458	12,872	13,632	12,079	10,115	10,398	
Iraq (Mesopotamia) <sup>11</sup>	February	5,270	5,055	6,136	5,619	6,136	7,153	
Palestine	March	271	281	243	227	282	253	
Persia		16,562	16,562	14,280	15,000	16,000		
Syria and Lebanon		1,797	1,400	1,404	2,149	2,540	2,682	
India, British	December-April	22,412	23,201	23,237	23,350	23,336	25,540	
Native States	do	12,208	11,848	12,353	12,158	12,445	16,259	
China		12,208	11,848	12,353	12,158	12,445	16,259	
Philippines	December <sup>6</sup>	29,700	280	344	369	368	360	
Dutch East Indies:								
Java and Madura	do	915		1,292				
Outer possessions	do	116		121				
Estimated total exclusive of Russia <sup>3</sup>		114,100						
<b>Oceania:</b>								
Australia	December <sup>6</sup>	85,556	103,563	104,267	100,827	103,481	104,558	106,966
New Zealand	April	23,382	24,905	25,649	27,134	29,051	30,841	30,585
Estimated total <sup>3</sup>		109,000						
<b>Total countries reporting all periods including Russia—</b>								
To 1920 (45) <sup>17</sup>		428,938	489,900	508,988	517,876	529,065	516,107	
To 1931 (16) <sup>17,18</sup>		237,420	269,990	276,143	280,031	287,218	207,395	304,203
Estimated world total including Russia <sup>3</sup>		642,400						

Bureau of Agricultural Economics. Official sources and International Institute of Agriculture unless otherwise stated. Figures in parentheses are interpolated.

<sup>1</sup> Average for 5-year period if available, otherwise for any year or years within this period except as otherwise stated.

<sup>2</sup> Incomplete.

<sup>3</sup> These totals include countries with less than 100,000 interpolations for a few countries not reporting each year and rough estimates for some others.

<sup>4</sup> Unofficial.

<sup>5</sup> Census figures.

<sup>6</sup> Countries reporting as of Dec. 31 are considered as of Jan. 1 of the following year; i. e., figures for number of sheep in France as of Dec. 31, 1925, have been placed in 1926 column.

<sup>7</sup> Year 1925.

<sup>8</sup> Year 1920.

<sup>9</sup> June, 1930.

<sup>10</sup> In rural communities only.

<sup>11</sup> May.

<sup>12</sup> Years 1924-1926. Statistical Review, October, 1928, p. 6. Year 1927. Agricultural Statistics of the U. S. S. R. Lenin Academy, 1927-1930. Planned Economy No. 12, 1930, State Planning Board.

<sup>13</sup> Goats included.

<sup>14</sup> Estimate based on increase reported in June, compared with preceding June.

<sup>15</sup> Estimate based on increase in 1920 in provinces which supported 80 per cent of total in China in 1914.

<sup>16</sup> Average of range from 25,000,000 to 45,000,000.

<sup>17</sup> Comparable totals for number of countries indicated.

<sup>18</sup> Excluding Russia.

TABLE 351.—*Sheep: Receipts and stocker and feeder shipments at all public stockyards, 1922-1931*

## RECEIPTS

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands
1922----	1,835	1,399	1,405	1,227	1,092	1,700	1,677	1,951	2,303	3,311	2,288	1,516	22,364
1923----	1,636	1,366	1,430	1,447	1,794	1,428	1,661	1,800	2,059	3,464	1,816	1,526	22,025
1924----	1,697	1,412	1,367	1,348	1,344	1,550	1,672	2,005	3,027	3,295	1,879	1,605	22,201
1925----	1,467	1,388	1,504	1,541	1,689	1,603	1,699	2,064	3,027	3,198	1,712	1,608	22,100
1926----	1,548	1,486	1,694	1,502	1,717	1,913	1,739	2,277	3,279	3,090	1,917	1,706	23,868
1927----	1,740	1,501	1,558	1,486	2,013	1,816	1,676	2,209	2,848	3,587	1,896	1,609	23,939
1928----	1,705	1,669	1,520	1,591	1,952	1,913	1,898	2,362	3,386	3,938	2,053	1,610	25,597
1929----	1,877	1,544	1,527	2,012	2,173	1,752	2,119	2,545	3,355	4,063	2,168	1,703	25,568
1930----	1,903	1,803	2,151	2,230	2,334	2,230	2,266	2,533	3,580	3,784	2,007	2,307	29,806
1931----	2,175	1,964	2,120	2,713	2,810	2,587	2,535	3,270	3,900	3,986	2,511	2,182	33,023

## STOCKER AND FEEDER SHIPMENTS

1922	183	169	143	97	145	191	204	330	534	1,138	757	255	4,167
1923	171	169	114	82	216	117	188	341	597	1,489	540	154	4,478
1924	149	106	83	105	118	152	226	444	973	1,438	676	206	4,076
1925	138	119	94	109	178	137	193	421	857	1,392	475	219	4,332
1926	155	107	83	124	130	238	260	567	1,098	1,150	493	223	4,623
1927	207	136	140	118	259	257	215	389	943	1,560	497	174	4,805
1928	116	101	95	133	205	278	234	564	1,040	1,466	544	198	5,011
1929	128	115	122	210	218	226	231	639	1,027	1,831	575	183	5,565
1930	126	101	99	134	142	216	206	465	907	1,024	761	282	4,465
1931	184	105	103	189	176	289	243	718	1,104	1,181	655	182	5,129

Bureau of Agricultural Economics. Compiled from data of livestock and meat-reporting service of bureau.

TABLE 352.—*Sheep: Receipts at principal public stockyards and at all public stockyards, 1922-1931*

Year	Chi- cago	Dan- ver	East St. Louis	Fort Worth	Kansas City	Omaha	South St. Joseph	South St. Paul	Sioux City	Total nine mar- kets <sup>1</sup>	All other stock- yards report- ing	Total all stock- yards report- ing <sup>1</sup>
	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands
1922----	3,874	1,867	628	325	1,574	2,533	730	499	223	12,252	10,112	22,364
1923----	4,098	1,857	561	386	1,671	2,970	879	454	216	13,191	8,834	22,025
1924----	4,192	2,040	489	373	1,569	2,844	1,089	476	310	13,341	8,820	22,201
1925----	3,969	2,357	559	314	1,500	2,420	1,143	545	360	13,166	8,934	22,100
1926----	4,405	1,826	636	445	1,762	2,780	1,308	773	449	14,378	9,490	23,868
1927----	3,829	1,908	374	445	1,616	2,604	1,348	705	527	13,555	10,384	23,939
1928----	3,893	2,285	510	458	1,767	3,037	1,580	891	568	14,974	10,623	25,597
1929----	3,785	2,280	534	540	1,753	3,031	1,636	1,139	840	15,543	11,320	26,868
1930----	4,335	2,062	584	452	2,016	3,410	1,634	1,354	1,183	17,015	12,793	29,806
1931----	4,489	2,499	661	1,173	2,214	3,510	1,572	1,690	1,279	19,118	13,905	33,023

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-reporting service of the bureau. Receipts, 1900-1921, are available in 1924 Yearbook, p. 933, Table 540.

<sup>1</sup> Rounded totals of complete figures.

# BEEF CATTLE, HOGS, SHEEP, HORSES, MULES, ETC. 801

TABLE 353.—*Farm prices of sheep, per head, by ages, United States, January 1, 1912-1932*

Jan. 1—	Under 1 year old	Ewes 1 year and over	Wethers 1 year and over	Rams	Jan. 1—	Under 1 year old	Ewes 1 year and over	Wethers 1 year and over	Rams
	Dollars	Dollars	Dollars	Dollars		Dollars	Dollars	Dollars	Dollars
1912.....	2.64	3.45	3.43	8.26	1923.....	6.80	7.67	5.90	14.30
1913.....	3.11	3.98	3.93	8.80	1924.....	6.97	8.10	5.98	15.55
1914.....	3.22	4.06	4.06	8.49	1925.....	8.53	10.02	7.13	16.91
1915.....	3.62	4.59	4.48	9.01	1926.....	9.04	11.01	7.32	18.45
1916.....	4.13	5.35	5.02	10.32	1927.....	7.91	10.32	6.60	18.78
1917.....	5.63	7.48	6.78	13.62	1928.....	8.45	10.86	7.23	19.63
1918.....	9.06	12.70	11.26	20.84	1929.....	8.93	11.19	7.64	20.27
1919.....	8.82	12.44	11.02	21.90	1930.....	7.85	9.10	6.44	19.63
1920.....	8.07	11.04	9.64	21.94	1931.....	4.64	5.43	3.43	12.94
1921.....	5.33	6.38	5.94	15.13	1932.....	2.87	3.47	2.38	8.23
1922.....	4.25	4.83	4.05	11.31					

Bureau of Agricultural Economics. Based on returns from special price reporters. Average price, by States, weighted by estimated numbers each age group.

TABLE 354.—*Sheep: Estimated average price per 100 pounds received by producers, United States, 1922-1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weighted average
	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1922.....	4.57	5.71	6.51	6.43	6.65	6.09	6.11	5.98	5.70	5.93	6.02	6.27	5.96
1923.....	6.88	6.83	7.06	7.20	6.92	6.43	6.43	6.22	6.57	6.33	6.20	6.39	6.65
1924.....	6.71	6.82	7.22	7.45	7.33	7.09	6.80	6.32	6.30	6.32	6.39	6.84	6.81
1925.....	7.86	8.41	8.20	8.42	7.63	7.04	7.17	7.32	7.27	7.31	7.51	7.70	7.70
1926.....	7.95	8.20	7.60	7.67	7.78	7.56	7.09	6.92	7.13	6.93	6.75	6.95	7.43
1927.....	6.87	7.16	7.41	7.40	7.68	7.27	7.16	7.13	7.06	7.05	7.42	7.38	7.26
1928.....	7.52	7.60	7.85	8.11	8.09	7.84	7.56	7.53	7.58	7.50	7.50	7.29	7.68
1929.....	7.84	7.98	8.36	8.40	8.09	7.86	7.25	7.32	7.01	6.83	6.75	6.61	7.55
1930.....	6.91	6.84	6.59	6.44	5.86	5.52	4.65	4.13	4.21	3.93	3.98	3.96	5.36
1931.....	4.04	4.15	4.24	4.24	3.91	3.28	3.01	3.00	2.80	2.63	2.63	2.52	3.43

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices by States, weighted by number of sheep Jan. 1, to obtain a price for the United States; yearly price obtained by weighting monthly prices by Federal inspected slaughter. For previous data see 1930 or earlier yearbooks.

TABLE 355.—*Lambs: Estimated average price per 100 pounds received by producers, United States, 1922-23 to 1931-32*

Year	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	Weighted average
	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1922-23.....	9.87	9.55	9.39	9.43	10.06	10.30	10.49	10.09	10.83	11.01	10.69	11.00	10.30
1923-24.....	10.72	10.60	9.96	10.28	10.17	10.01	10.10	10.19	10.53	11.22	11.32	11.43	10.54
1924-25.....	11.21	10.50	10.15	10.18	10.35	10.55	10.96	12.09	13.13	13.48	12.22	11.99	11.45
1925-26.....	11.02	11.71	11.50	11.95	12.04	12.20	12.67	12.79	12.02	11.56	11.32	11.78	11.38
1926-27.....	12.07	11.52	11.12	11.32	11.31	11.11	10.92	10.65	10.84	11.55	11.97	11.92	11.90
1927-28.....	11.95	11.44	11.15	11.14	11.22	11.42	11.39	11.34	11.90	12.31	12.73	13.03	11.76
1928-29.....	13.18	12.25	11.88	11.97	11.57	11.50	11.41	12.23	12.60	13.12	13.36	12.79	12.31
1929-30.....	12.31	11.90	11.46	11.08	10.97	10.74	10.76	11.10	10.46	9.63	9.02	8.92	10.71
1930-31.....	9.02	8.08	6.82	6.67	6.15	6.21	6.18	6.30	6.59	6.84	6.94	6.96	6.92
1931-32.....	6.42	5.80	5.33	5.04	4.64	4.46	4.19						

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices by States, weighted by number of lambs Jan. 1, to obtain a price for the United States; yearly price obtained by weighting monthly prices by receipts at principal markets. For previous data see 1930 or earlier yearbooks.

TABLE 356.—*Sheep and lambs: Average price per 100 pounds at Chicago, by months, 1901-1931*

## SHEEP

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average 1
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1901.....	4.08	4.10	4.60	4.72	4.22	3.68	3.52	3.45	3.32	3.30	3.18	3.45	3.79
1902.....	4.12	4.70	4.70	5.65	5.70	4.20	3.72	3.55	3.38	3.35	3.32	3.65	4.18
1903.....	4.12	4.65	5.40	5.05	4.82	4.20	3.48	3.22	3.18	3.18	3.05	3.20	3.96
1904.....	3.95	4.05	4.60	4.98	5.10	4.45	3.85	3.65	3.50	3.65	4.08	4.58	4.20
1905.....	5.15	5.55	5.50	5.08	4.75	4.72	5.10	4.95	4.72	5.10	5.10	5.25	5.08
1906.....	5.40	5.12	5.28	5.35	5.55	5.45	5.25	4.98	5.15	4.90	5.05	5.08	5.21
1907.....	5.15	5.20	5.50	5.65	5.78	5.90	5.32	5.32	5.18	4.82	4.38	4.18	5.20
1908.....	4.80	5.10	5.90	5.70	5.40	4.65	4.05	3.80	3.75	4.05	4.20	4.30	4.04
1909.....	4.90	5.00	5.25	5.65	6.15	5.30	4.70	4.60	4.65	4.30	4.55	4.85	4.99
1910.....	5.55	6.50	7.60	7.60	6.55	5.10	4.20	4.20	4.25	3.95	3.70	3.90	5.26
1911.....	4.10	4.15	4.70	4.20	4.45	3.80	3.95	3.50	3.80	3.65	3.45	3.55	3.91
1912.....	4.30	4.15	5.30	5.90	6.15	4.50	4.25	4.05	4.15	4.00	4.05	4.45	4.60
1913.....	5.35	5.90	6.40	6.45	5.85	5.05	4.50	4.35	4.30	4.55	4.60	4.95	5.19
1914.....	5.50	5.70	5.95	6.25	5.65	5.10	5.40	5.53	5.30	5.20	5.65	5.40	5.55
1915.....	5.80	6.45	7.45	7.70	7.35	5.50	6.05	6.25	5.75	6.00	5.85	6.20	6.36
1916.....	7.20	7.75	8.25	8.15	8.20	7.35	7.25	7.35	7.80	7.50	8.00	9.00	7.82
1917.....	10.00	11.25	11.70	12.10	13.00	10.00	9.10	9.75	11.15	11.65	11.25	11.50	11.04
1918.....	12.20	12.35	13.60	15.65	14.75	13.40	12.65	13.15	11.80	10.45	9.85	9.40	12.44
1919.....	10.35	11.25	14.05	14.50	12.25	8.30	9.70	9.75	8.30	8.15	8.30	9.60	10.47
1920.....	11.80	13.35	13.40	14.25	12.25	8.50	8.90	7.70	6.85	6.45	5.75	4.70	9.40
1921.....	5.07	4.90	6.14	6.58	6.33	4.46	5.08	4.53	4.49	4.71	4.40	4.92	5.13
1922.....	7.26	8.28	9.17	9.33	7.35	5.59	6.12	5.63	6.05	6.25	7.48	7.23	7.15
1923.....	7.72	8.08	8.64	8.90	6.74	5.00	5.16	7.09	7.25	6.85	6.69	7.37	7.10
1924.....	8.16	9.12	10.50	10.21	8.11	5.82	5.66	6.18	5.46	6.00	6.02	8.45	7.67
1925.....	10.33	9.69	9.22	7.84	7.96	6.25	7.48	6.83	6.95	7.64	8.16	9.57	8.16
1926.....	9.72	9.18	8.82	8.87	7.97	5.85	5.97	6.50	6.25	6.12	5.88	5.86	7.25
1927.....	6.94	8.03	8.88	9.62	7.44	5.88	6.25	6.47	6.14	6.00	6.40	6.41	7.04
1928.....	7.08	8.96	9.47	10.16	8.53	6.12	6.28	6.72	6.34	6.18	5.64	7.03	7.30
1929.....	9.32	8.78	9.72	10.34	6.78	6.28	5.85	5.34	4.66	4.70	5.38	5.41	6.87
1930.....	6.50	5.53	5.59	5.66	5.31	3.38	3.12	3.53	3.50	3.10	3.34	3.22	4.32
1931.....	3.97	4.25	4.54	3.90	2.78	1.62	2.50	2.03	1.58	1.94	2.16	2.18	2.79

## LAMBS

1901.....	5.30	5.10	5.25	5.10	4.85	4.60	5.10	4.80	4.35	4.30	4.10	4.75	4.80
1902.....	5.55	6.05	6.15	6.30	6.20	5.80	5.65	5.35	4.85	4.70	4.55	4.80	5.40
1903.....	5.50	6.10	6.60	6.20	6.20	5.50	5.80	4.90	4.85	4.80	4.70	4.85	5.46
1904.....	5.55	5.40	5.30	5.60	5.70	5.60	6.15	5.45	5.15	5.15	5.50	6.25	5.57
1905.....	7.15	7.40	7.05	6.80	6.25	5.90	6.80	7.05	7.00	7.05	6.90	7.25	6.84
1906.....	7.25	6.75	6.40	6.20	6.65	6.75	6.90	7.00	7.15	6.95	6.90	7.10	6.83
1907.....	7.30	7.30	7.55	8.05	7.80	7.20	7.05	6.90	6.90	6.80	6.05	5.70	7.05
1908.....	6.80	6.70	7.20	7.25	6.65	5.75	6.20	6.05	5.35	5.50	5.85	6.70	6.33
1909.....	7.35	7.50	7.65	7.85	8.25	7.00	7.70	7.35	6.80	6.50	7.10	7.60	7.43
1910.....	8.30	8.65	9.40	9.10	8.40	7.60	7.10	6.70	6.80	6.05	6.25	6.10	7.59
1911.....	6.20	6.05	6.10	5.50	5.85	6.10	6.30	6.35	5.70	5.75	5.45	5.75	5.92
1912.....	6.50	6.15	7.30	7.95	8.30	6.90	7.25	7.10	7.00	6.75	7.15	7.75	7.18
1913.....	8.55	8.50	8.60	8.40	7.40	6.45	7.55	7.40	7.15	7.05	7.25	7.00	7.09
1914.....	7.90	7.60	7.65	7.60	8.10	7.95	8.45	8.15	7.90	7.60	8.75	8.30	7.99
1915.....	8.40	8.75	9.55	9.65	10.10	9.20	8.75	8.90	8.75	8.75	8.80	9.00	9.05
1916.....	10.30	10.90	11.10	10.45	10.75	9.55	10.55	10.75	10.90	10.15	11.40	12.70	10.77
1917.....	13.55	14.30	14.25	14.40	16.90	15.25	15.65	15.50	17.50	17.40	16.75	16.45	15.68
1918.....	17.20	16.60	17.55	19.20	18.00	16.85	18.50	17.50	17.25	15.35	15.10	14.00	16.98
1919.....	16.25	17.40	19.05	18.15	16.25	14.05	17.10	16.75	14.85	15.00	14.50	16.40	16.31
1920.....	19.50	19.95	18.30	18.90	17.40	14.25	15.55	13.20	13.20	12.35	11.70	11.20	15.50
1921.....	10.72	9.07	9.91	9.69	11.07	10.07	10.09	9.46	8.88	8.66	9.25	10.86	9.86
1922.....	12.67	14.49	15.39	14.10	12.05	12.42	13.04	12.51	13.53	13.94	14.17	14.93	13.68
1923.....	14.69	14.85	14.56	14.42	14.12	14.81	14.22	12.89	13.52	12.93	12.75	12.90	13.80
1924.....	13.53	14.95	16.06	16.22	15.23	14.12	13.79	13.57	13.38	13.52	14.03	16.47	14.57
1925.....	18.28	17.59	16.28	14.55	13.08	15.86	15.11	14.88	15.19	15.20	15.44	16.15	15.66
1926.....	15.28	13.78	13.48	14.38	15.30	16.66	14.31	14.20	14.05	13.88	13.25	12.57	14.26
1927.....	12.64	13.28	15.27	15.67	14.75	15.69	14.25	13.68	13.46	13.70	13.80	13.14	14.12
1928.....	13.16	15.39	16.26	16.81	16.10	16.84	15.61	14.72	14.29	13.12	13.31	14.31	14.92
1929.....	16.37	16.53	17.07	16.32	13.62	15.34	14.38	13.50	13.19	12.72	12.72	13.22	14.62
1930.....	13.28	11.08	10.28	9.38	9.73	12.28	10.18	9.39	8.24	7.72	7.84	7.44	9.09
1931.....	8.43	8.19	8.31	9.06	8.55	7.72	6.62	6.88	6.49	5.88	5.64	5.32	7.20

Bureau of Agricultural Economics. Figures prior to 1921 are from the Chicago Drovers Journal Year-book, average native and western sheep and average aged lambs. Subsequent figures are bulk of sales prices from data of the livestock and meat reporting service of the bureau.

1 Simple average of monthly prices.

TABLE 357.—*Sheep and lambs: Average price per 100 pounds at Chicago and Omaha, by months, July, 1930–December, 1931*

## CHICAGO

Year and month	Lambs		Yearling wethers 90-110 pounds Medium to Choice	Ewes		Feeding lambs, 50-75 pounds	
	90 pounds down, Good and Choice	All weights, Common		90-120 pounds, Medium to Choice	All weights, Cull and Common	Good and Choice	Medium
1930	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
July.....	10.13	6.59	7.43	3.28	1.55	7.22	6.52
August.....	9.40	6.20	6.44	3.47	2.01	6.89	6.12
September.....	8.49	5.64	6.14	3.60	2.22	7.12	6.16
October.....	8.06	5.60	5.60	3.20	1.79	7.00	6.08
November.....	7.95	5.46	5.93	3.38	1.88	7.06	6.09
December.....	7.97	5.50	5.70	3.12	1.76	7.12	6.12
Average, 6 months.....	8.67	5.88	6.21	3.34	1.92	7.07	6.18
1931							
January.....	8.71	6.48	6.65	3.92	2.61	7.52	6.65
February.....	8.59	6.52	6.55	4.32	2.89	7.98	7.12
March.....	8.89	6.91	6.92	4.50	3.00	7.99	7.10
April.....	9.35	7.56	6.94	4.12	2.69		
May 1.....	8.84	6.69	6.05	2.68	1.80		
June 1.....	8.70	5.78	5.53	2.04	1.09		
July.....	7.67	4.78	4.94	2.04	1.48	5.30	4.46
August.....	7.58	4.41	4.92	2.57	1.44	5.41	4.73
September.....	6.84	4.27	4.70	2.01	1.11	5.41	4.58
October.....	6.36	4.23	4.43	2.21	1.27	5.16	4.43
November.....	6.02	4.05	4.15	2.33	1.46	4.76	4.25
December.....	5.68	3.86	3.55	2.40	1.54	4.72	4.12
Average.....	7.77	5.46	5.47	3.00	1.86		

## OMAHA

<b>1930</b>							
July.....	9.54	6.58	6.12	2.72	1.50	6.80	5.91
August.....	8.93	5.86	5.47	3.24	1.75	6.61	5.66
September.....	7.78	5.40	5.02	2.98	1.64	6.73	5.76
October.....	7.56	5.29	5.03	2.51	1.40	6.50	5.56
November.....	7.50	5.43	5.44	3.17	1.74	6.74	5.69
December.....	7.63	5.22	5.40	3.22	1.86	6.92	5.90
Average, 6 months.....	8.16	5.64	5.51	2.97	1.65	6.72	5.75
<b>1931</b>							
January.....	8.22	6.10	5.72	3.56	2.00	7.60	6.28
February.....	8.21	6.35	5.97	4.13	2.46	7.53	6.45
March.....	8.42	6.61	6.26	4.38	2.69	7.81	6.69
April.....	8.07	7.50	6.58	3.79	2.31	7.98	6.75
May 1.....	8.02	6.83	5.98	2.74	1.74	7.52	6.42
June 1.....	8.22	5.74	4.80	1.48	.87	5.45	4.61
July.....	7.02	4.49	4.24	2.02	1.17	5.23	4.41
August.....	7.12	4.50	4.50	2.15	1.14	5.11	4.31
September.....	6.33	4.25	4.07	1.84	.98	5.08	4.22
October.....	5.78	3.90	4.06	1.90	1.04	4.53	3.55
November.....	5.58	3.69	3.88	2.00	1.00	4.26	3.33
December.....	5.23	3.57	3.60	1.95	1.00	3.96	3.15
Average.....	7.31	5.28	4.97	2.67	1.53	6.01	5.01

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-reporting service of the bureau. Earlier data in 1927 Yearbook, pp. 1032–1034 and in 1931 Yearbook, p. 870.

<sup>1</sup> Beginning May 18, quotations were on shorn basis.

<sup>2</sup> Effective June 1, new crop lambs were classified as lambs and lambs of or closely approaching the yearling age were classified as yearlings.

TABLE 358.—*Sheep and lambs: Slaughter<sup>1</sup> under Federal inspection by months, 1922-1931*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	<i>Thou-</i> <i>sands</i>	<i>Thou-</i> <i>sands</i>	<i>Thou-</i> <i>sands</i>	<i>Thou-</i> <i>sands</i>	<i>Thou-</i> <i>sands</i>	<i>Thou-</i> <i>sands</i>	<i>Thou-</i> <i>sands</i>	<i>Thou-</i> <i>sands</i>	<i>Thou-</i> <i>sands</i>	<i>Thou-</i> <i>sands</i>	<i>Thou-</i> <i>sands</i>	<i>Thou-</i> <i>sands</i>	<i>Thou-</i> <i>sands</i>
1922.....	954	776	837	739	873	1,028	964	1,024	1,013	981	882	868	10,929
1923.....	1,021	836	977	960	973	914	962	957	900	1,046	915	978	11,529
1924.....	1,063	912	868	860	959	975	1,051	1,063	1,150	1,148	950	972	11,991
1925.....	990	884	984	1,012	1,030	999	1,071	1,031	1,086	1,083	879	981	12,001
1926.....	1,039	988	1,163	994	959	1,081	1,042	1,063	1,224	1,167	1,039	1,172	12,961
1927.....	1,115	1,006	1,027	960	992	1,058	1,014	1,168	1,185	1,194	1,071	1,094	12,883
1928.....	1,151	1,048	1,016	918	1,016	1,109	1,076	1,196	1,307	1,400	1,189	1,063	13,498
1929.....	1,160	953	1,006	1,119	1,202	1,108	1,255	1,298	1,317	1,365	1,159	1,091	14,023
1930.....	1,225	1,187	1,358	1,287	1,370	1,295	1,411	1,413	1,561	1,517	1,806	1,427	16,096
1931.....	1,426	1,223	1,324	1,493	1,444	1,516	1,491	1,598	1,667	1,804	1,505	1,581	18,071

Bureau of Animal Industry.

<sup>1</sup> The figures include condemned carcasses.TABLE 359.—*Mutton and lamb: International trade, average 1925-1929, annual 1927-1930*

Country	Calendar year									
	Average 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
New Zealand.....	801,079	0	311,135	0	317,539	0	305,951	0	381,914	0
Argentina.....	176,547	0	183,260	0	171,108	0	177,576	0	177,693	0
Australia <sup>2</sup> .....	72,163	17	93,520	6	46,363	4	84,929	24	100,411	0
Uruguay.....	41,048	0	52,102	0	31,010	0	49,112	0	82,259	0
Netherlands.....	14,942	1,049	16,084	1,254	14,380	759	12,859	692	11,342	550
Irish Free State.....	1,370	344	1,478	275	2,359	312	2,771	246	2,115	244
Union of South Africa.....	171	20	133	52	201	47	160	0	209	0
Total.....	607,310	1,430	657,712	1,587	682,960	1,122	633,358	962	736,033	794
PRINCIPAL IMPORTING COUNTRIES										
United Kingdom.....	0	629,309	0	627,303	0	640,414	0	642,712	0	730,270
France.....	213	22,035	274	28,322	305	15,173	141	21,060	143	30,058
Germany.....	637	7,868	622	10,083	79	9,909	3	9,120	2,457	9,979
United States.....	1,087	7,255	937	9,544	1,024	9,202	835	11,395	1,251	8,181
Norway.....	0	4,581	0	4,902	0	4,358	0	4,714	0	4,904
Belgium.....	702	3,763	839	3,914	445	3,970	1,125	4,896	1,724	4,387
Canada.....	1,501	2,335	1,859	1,946	1,123	2,333	573	4,401	241	4,412
Denmark.....	9	2,152	5	2,232	1	2,397	0	2,548	5	2,594
Sweden.....	36	1,058	20	1,371	45	1,089	38	963	25	1,515
Total.....	4,185	680,356	4,596	691,117	3,027	688,845	2,715	701,848	5,846	790,005

Bureau of Agricultural Economics. Official sources except as otherwise noted.

<sup>1</sup> Preliminary.<sup>2</sup> Year ended June 30.<sup>3</sup> International Yearbook of Agricultural Statistics.TABLE 360.—*Mutton and lamb, frozen: Cold-storage holdings, United States 1922-1931*

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
1922.....	6,444	3,914	2,865	2,878	2,071	2,810	3,720	3,308	3,376	3,478	3,458	3,633
1923.....	4,523	5,980	5,758	6,635	5,774	4,445	3,856	2,752	1,785	1,719	1,997	2,014
1924.....	2,493	2,306	2,173	1,719	2,063	2,273	2,917	2,267	2,280	2,525	3,166	3,326
1925.....	2,049	2,356	2,294	2,090	1,998	1,818	1,635	1,349	1,339	1,112	1,435	1,549
1926.....	1,820	2,354	3,346	3,289	2,363	1,697	1,871	1,613	1,929	2,224	2,814	3,166
1927.....	4,556	4,447	4,074	2,940	1,862	1,210	1,360	1,161	1,302	1,991	2,965	3,790
1928.....	4,408	4,404	4,090	3,252	1,826	1,276	1,647	1,622	1,681	2,115	4,321	5,472
1929.....	5,623	4,009	3,252	3,109	2,533	2,451	3,061	2,639	3,159	4,115	4,992	5,194
1930.....	5,317	4,687	5,408	5,174	5,190	4,639	4,476	3,977	4,520	4,326	4,025	4,025
1931.....	4,677	4,081	3,573	3,063	2,529	2,371	2,685	1,892	1,975	1,975	1,975	1,975

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

TABLE 361.—*Sheep and lambs: Shipments, slaughter, value of production, and income, by States, 1930*

State and division	Shipments and local slaughter				Inshipments, stocker, feeding, and breeding			
	Sheep		Lambs		Sheep		Lambs	
	Head	Total weight	Head	Total weight	Head	Total weight	Head	Total weight
	Thousands	1,000 pounds	Thousands	1,000 pounds	Thousands	1,000 pounds	Thousands	1,000 pounds
Maine.....	11	1,100	21	1,280	1	100		
New Hampshire.....	3	300	4	240				
Vermont.....	3	300	14	840				
Massachusetts.....	3	300	4	280	1	100		
Rhode Island.....			1	65				
Connecticut.....			3	195				
New York.....	53	6,201	205	14,410	4	400	27	1,620
New Jersey.....			2	150				
Pennsylvania.....	49	5,145	159	11,130			2	120
North Atlantic.....	122	13,346	413	28,550	6	600	29	1,740
Ohio.....	170	19,550	903	63,210	4	400	32	2,080
Indiana.....	57	6,840	551	46,835	26	2,600	150	9,750
Illinois.....	73	8,760	533	45,305	9	900	188	13,020
Michigan.....	127	15,240	816	69,360	9	900	90	6,120
Wisconsin.....	49	5,390	390	31,200	18	1,980	106	11,620
North Central, East.....	476	55,780	3,193	255,910	66	6,780	624	42,590
Minnesota.....	94	10,396	520	43,144	56	5,600	163	9,780
Iowa.....	121	14,520	1,025	82,000	45	4,800	500	32,500
Missouri.....	104	11,440	866	64,950	25	2,625	245	15,925
North Dakota.....	53	5,530	385	28,875	10	1,000	97	6,305
South Dakota.....	62	6,820	530	39,750	10	1,100	148	10,725
Nebraska.....	60	7,590	1,504	135,340	46	4,600	1,106	71,880
Kansas.....	71	7,810	583	52,455	28	2,800	460	29,900
North Central, West.....	574	64,406	5,413	446,514	223	22,525	2,714	177,025
North Central.....	1,050	120,186	8,606	702,424	289	29,305	3,338	219,615
Delaware.....			1	65				
Maryland.....	9	990	79	6,320	1	110	2	130
Virginia.....	29	3,480	327	26,160	1	90		
West Virginia.....	45	4,950	332	26,560				
North Carolina.....	9	765	34	1,970				
South Carolina.....	1	90	3	135				
Georgia.....	1	85	5	400				
Florida.....	6	510	5	250				
South Atlantic.....	100	10,870	789	61,760	2	200	2	130
Kentucky.....	105	11,070	838	62,850	11	1,100		
Tennessee.....	31	3,410	224	16,800	2	220	2	140
Alabama.....	6	480	12	600				
Mississippi.....	7	400	3	160	1	80		
Arkansas.....	4	420	12	720				
Louisiana.....	4	372	5	250	1	90		
Oklahoma.....	24	2,520	91	5,915	15	1,500	50	2,500
Texas.....	285	27,075	519	31,790	12	1,200	7	420
South Central.....	464	46,347	1,704	119,075	42	4,190	59	3,060
Montana.....	231	25,410	1,780	133,500	10	1,000	2	150
Idaho.....	190	21,850	1,622	123,780	150	15,000	380	24,700
Wyoming.....	133	14,098	1,366	96,985	12	1,200	30	2,040
Colorado.....	155	16,275	2,615	209,200	70	7,000	1,469	92,547
New Mexico.....	51	5,100	608	39,890	25	2,500	3	210
Arizona.....	96	10,272	223	16,725				X
Utah.....	215	23,005	1,120	78,400	20	2,000	56	3,920
Nevada.....	80	8,375	362	23,530	2	210	18	1,170
Washington.....	31	3,410	382	30,560	4	400	24	1,080
Oregon.....	136	14,552	1,111	84,436	4	440		
California.....	325	32,500	1,850	139,550	100	9,000	131	7,860
Western.....	1,043	174,847	13,037	982,037	397	38,750	2,113	134,277
United States.....	3,370	365,596	24,549	1,893,846	736	73,045	5,541	358,822

See footnote at end of table.

TABLE 361.—*Sheep and lambs: Shipments, slaughter, value of production, and income, by States, 1930—Continued*

State and division	Farm slaughter				Value of amount consumed on farms	Receipts from sales	Gross income	Value of production
	Sheep		Lambs					
	Head	Total weight	Head	Total weight				
	Thou- sands	1,000 pounds	Thou- sands	1,000 pounds	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars
Maine.....	2	200	5	300	10	201	211	201
New Hampshire.....	2	200	2	120	5	56	61	46
Vermont.....	1	100	2	120	4	107	111	111
Massachusetts.....			1	65	1	41	42	42
Rhode Island.....						7	7	7
Connecticut.....			1	65	1	28	29	33
New York.....	15	1,755	35	2,485	30	1,776	1,806	1,570
New Jersey.....			1	75	2	21	23	22
Pennsylvania.....	8	880	12	840	15	1,275	1,290	1,318
North Atlantic.....	28	3,135	59	4,070	68	3,512	3,580	3,353
Ohio.....	8	960	12	960	79	5,811	5,800	5,383
Indiana.....	1	125	2	160	14	3,488	3,502	3,503
Illinois.....	4	480	5	425	51	3,375	3,426	3,199
Michigan.....	7	840	8	600	31	6,039	6,070	5,441
Wisconsin.....	5	625	8	720	61	1,807	1,868	2,003
North Central, East.....	25	3,030	35	2,865	236	20,520	20,756	19,079
Minnesota.....	6	744	12	972	90	3,230	3,320	3,933
Iowa.....	12	1,500	13	1,065	147	4,721	4,808	4,521
Missouri.....	5	600	10	750	71	4,912	4,983	4,517
North Dakota.....	6	720	9	720	67	1,642	1,709	2,139
South Dakota.....	4	440	10	750	76	2,610	2,686	3,118
Nebraska.....	2	220	1	75	19	7,643	7,662	4,319
Kansas.....	2	240	3	228	25	2,901	2,926	2,872
North Central, West.....	37	4,464	58	4,561	405	27,059	28,154	25,419
North Central.....	62	7,494	93	7,426	731	48,179	48,910	45,008
Delaware.....						4	4	4
Maryland.....	1	110	2	160	10	705	715	693
Virginia.....	4	480	9	720	50	2,575	2,625	2,598
West Virginia.....	6	660	10	800	57	2,613	2,670	2,792
North Carolina.....	2	180	3	165	14	239	253	269
South Carolina.....	1	90	1	45	3	24	27	19
Georgia.....	2	170	2	100	9	49	58	65
Florida.....						48	48	48
South Atlantic.....	16	1,690	27	1,990	143	6,257	6,400	6,498
Kentucky.....	7	840	9	675	67	6,352	6,419	6,069
Tennessee.....	3	330	5	375	32	1,728	1,761	1,865
Alabama.....	2	160	2	100	7	89	90	76
Mississippi.....	1	80	2	100	6	38	44	41
Arkansas.....	1	105	3	190	7	72	79	85
Louisiana.....	2	186	4	200	13	47	60	69
Oklahoma.....	2	220	2	130	16	363	379	421
Texas.....	5	450	11	770	68	3,612	3,680	6,814
South Central.....	23	2,371	38	2,530	216	12,302	12,518	15,440
Montana.....	15	1,800	20	1,500	127	9,816	9,943	10,630
Idaho.....	8	920	10	800	80	7,538	7,618	8,309
Wyoming.....	5	550	10	710	63	6,821	6,884	8,043
Colorado.....	17	1,785	22	1,760	213	11,526	11,739	7,903
New Mexico.....	60	6,000	24	1,680	353	2,275	2,628	3,794
Arizona.....	55	5,385	20	1,500	384	1,929	2,313	2,814
Utah.....	25	2,675	23	1,725	210	6,191	6,401	7,005
Nevada.....	8	800	7	476	59	1,826	1,885	2,261
Washington.....	5	600	15	1,200	42	2,148	2,190	2,308
Oregon.....	17	1,870	18	1,368	119	6,273	6,392	7,229
California.....	20	2,000	40	3,080	254	12,518	12,772	13,067
Western.....	235	24,885	209	15,799	1,904	68,861	70,765	73,963
United States.....	364	39,575	426	31,815	3,062	139,111	142,173	144,342

Bureau of Agricultural Economics. Estimates of Division of Crop and Livestock Estimates. Subject to revision. For 5-year average 1924-1928 see 1931 Yearbook Table 414. The figures on income and value of production as shown in Table 455 are computed from the data shown in this table. The difference between value of production and income arises from the fact that in computing value of production allowance is made for changes in inventory numbers between the beginning and end of the year, while in computing income these changes are not used.

**BEEF CATTLE, HOGS, SHEEP, HORSES, MULES, ETC. 807**

**TABLE 362.—Wool, shorn: Estimated production by States, 1925-1931**

State and division	Production							Number of fleeces <sup>1</sup>	
	1925	1926	1927	1928	1929	1930	1931	1925	1926
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	Thou- sands	Thou- sands
Maine.....	528	559	540	529	470	471	491	81	86
New Hampshire.....	102	110	117	122	109	113	107	16	17
Vermont.....	252	277	202	268	264	255	252	35	38
Massachusetts.....	68	62	63	62	59	66	56	11	10
Rhode Island.....	12	12	12	12	12	12	12	2	2
Connecticut.....	41	43	41	46	40	46	61	7	7
New York.....	2,898	3,081	3,212	3,096	3,096	3,110	3,008	397	422
New Jersey.....	31	32	32	30	37	37	43	5	6
Pennsylvania.....	2,805	2,730	2,730	2,898	2,982	3,108	3,248	374	374
North Atlantic.....	6,735	6,908	7,045	7,063	7,069	7,218	7,271	928	961
Ohio.....	14,407	14,760	15,662	14,776	14,661	15,066	15,463	1,786	1,800
Indiana.....	3,562	3,715	3,922	4,402	4,500	4,752	4,980	488	502
Illinois.....	3,852	3,794	4,186	4,166	4,514	4,815	4,797	465	530
Michigan.....	7,416	7,600	8,446	8,774	8,480	8,400	8,520	927	960
Wisconsin.....	2,250	2,475	2,774	2,888	2,888	3,226	3,102	300	330
North Central, East.....	31,047	32,344	34,900	35,006	35,043	36,258	36,858	3,966	4,112
Minnesota.....	3,151	3,634	4,211	4,700	5,372	6,115	6,435	404	400
Iowa.....	5,440	5,520	5,880	6,320	6,800	7,640	7,920	680	690
Missouri.....	5,537	5,500	5,505	5,686	6,099	6,865	7,304	850	855
North Dakota.....	2,263	2,772	3,654	4,250	5,287	6,264	7,012	276	334
South Dakota.....	4,446	4,772	5,418	6,149	7,003	7,794	8,820	570	582
Nebraska.....	2,114	2,334	2,400	2,544	2,685	3,000	2,786	290	315
Kansas.....	2,028	2,183	2,393	2,710	3,172	3,365	3,243	300	300
North Central, West.....	24,979	26,715	26,461	32,359	37,018	41,043	43,520	3,370	3,566
North Central.....	56,026	59,059	64,451	67,365	72,061	77,301	80,378	7,336	7,678
Delaware.....	12	12	12	18	19	19	24	2	2
Maryland.....	439	472	510	531	561	580	552	72	75
Virginia.....	1,485	1,696	1,810	1,965	2,105	2,200	2,225	318	326
West Virginia.....	2,272	2,205	2,263	2,046	2,798	2,844	3,021	437	416
North Carolina.....	270	304	350	387	408	376	394	60	66
South Carolina.....	48	45	50	55	52	52	52	12	11
Georgia.....	131	139	120	122	116	112	112	41	41
Florida.....	147	144	138	126	124	114	111	49	48
South Atlantic.....	4,804	5,016	3,269	5,820	6,183	6,297	6,491	989	985
Kentucky.....	3,125	3,278	3,658	3,807	3,901	4,175	4,080	651	683
Tennessee.....	1,144	1,118	1,174	1,287	1,344	1,423	1,531	266	260
Alabama.....	155	172	173	175	184	160	143	47	49
Mississippi.....	304	288	256	256	274	274	274	95	90
Arkansas.....	202	202	212	202	190	181	198	43	43
Louisiana.....	204	288	330	368	418	425	443	89	90
Oklahoma.....	372	410	531	690	886	1,034	1,170	51	54
Texas.....	27,056	28,900	34,725	40,120	46,779	48,262	53,360	3,767	3,993
South Central.....	32,052	34,656	41,059	46,905	53,976	55,984	61,198	5,009	5,232
Montana.....	20,158	23,051	24,693	26,970	31,122	34,034	35,948	2,344	2,590
Idaho.....	15,438	15,798	15,555	17,425	18,156	18,156	19,419	1,800	1,775
Wyoming.....	22,600	22,338	26,400	27,900	26,502	29,702	34,560	2,560	2,628
Colorado.....	6,956	8,132	8,877	11,300	12,269	13,446	13,541	940	1,070
New Mexico.....	12,033	13,084	14,023	14,824	15,230	16,870	16,632	1,910	2,013
Arizona.....	6,252	6,248	6,200	5,978	5,820	5,640	5,760	1,025	1,000
Utah.....	13,438	20,093	20,915	23,064	20,655	24,440	23,056	2,144	2,268
Nevada.....	7,500	8,508	8,015	8,923	7,777	7,944	8,720	1,050	1,105
Washington.....	4,750	4,998	5,233	5,635	5,485	6,175	6,336	500	500
Oregon.....	10,958	15,321	18,128	20,332	19,531	21,375	22,000	1,927	1,970
California.....	21,572	22,657	23,996	26,084	25,730	26,989	28,004	2,932	3,133
Western.....	152,615	163,263	172,095	187,435	188,277	204,771	213,976	19,192	20,032
United States.....	252,832	268,900	289,908	314,588	327,566	351,521	360,315	33,454	34,888

See footnotes at end of table.

TABLE 362.—Wool, shorn: Estimated production, by States, 1925-1931—Continued

State and division	Number of fleeces <sup>1</sup>					Weight per fleece <sup>1</sup>						
	1927	1928	1929	1930	1931	1925	1926	1927	1928	1929	1930	1931
	Thous- ands	Thous- ands	Thous- ands	Thous- ands	Thous- ands	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Maine.....	84	84	77	76	78	6.5	6.5	6.5	6.3	6.1	6.2	6.3
New Hampshire.....	18	19	17	18	17	6.4	6.5	6.5	6.4	6.4	6.3	6.3
Vermont.....	40	40	39	38	37	7.2	7.3	7.3	6.7	6.7	6.7	6.8
Massachusetts.....	10	10	10	11	10	6.2	6.2	6.3	6.2	5.9	6.0	5.9
Rhode Island.....	2	2	2	2	2	6.2	6.2	6.2	6.1	5.9	6.2	5.0
Connecticut.....	7	8	7	8	9	5.9	6.1	5.9	5.7	5.7	5.8	5.7
New York.....	440	430	430	432	412	7.3	7.3	7.3	7.2	7.2	7.2	7.3
New Jersey.....	5	5	6	6	7	6.2	6.3	6.3	6.1	6.1	6.1	6.2
Pennsylvania.....	364	397	403	420	433	7.5	7.3	7.5	7.3	7.4	7.4	7.5
North Atlantic.....	970	995	991	1,011	1,005	7.3	7.2	7.3	7.1	7.1	7.1	7.2
Ohio.....	1,910	1,802	1,810	1,860	1,818	8.1	8.2	8.2	8.2	8.1	8.1	8.5
Indiana.....	530	603	625	680	673	7.3	7.4	7.4	7.3	7.2	7.2	7.4
Illinois.....	585	565	615	664	641	7.2	7.2	7.2	7.4	7.3	7.3	7.4
Michigan.....	1,030	1,070	1,060	1,050	1,015	8.0	8.0	8.2	8.2	8.0	8.0	8.4
Wisconsin.....	365	375	385	430	425	7.5	7.5	7.6	7.7	7.5	7.5	7.3
North Central, East.....	4,420	4,415	4,495	4,604	4,572	7.8	7.9	7.9	7.9	7.8	7.8	8.1
Minnesota.....	533	595	680	784	825	7.8	7.9	7.9	7.9	7.9	7.8	7.8
Iowa.....	735	790	850	955	990	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Missouri.....	860	840	1,010	1,070	1,090	6.5	6.4	6.4	6.8	6.6	6.4	6.5
North Dakota.....	420	500	622	737	825	8.2	8.3	8.7	8.5	8.5	8.5	8.7
South Dakota.....	645	732	851	939	1,050	7.8	8.2	8.4	8.4	8.2	8.3	8.4
Nebraska.....	320	340	365	400	380	7.3	7.4	7.5	7.7	7.4	7.5	7.3
Kansas.....	356	400	470	498	475	6.8	6.6	6.7	6.8	6.7	6.8	6.8
North Central, West.....	3,869	4,197	4,851	5,383	5,635	7.4	7.5	7.6	7.7	7.6	7.6	7.7
North Central.....	8,289	8,612	9,346	10,047	10,207	7.6	7.7	7.8	7.8	7.7	7.7	7.9
Delaware.....	2	3	3	3	4	6.0	6.0	6.0	6.1	6.3	6.2	6.0
Maryland.....	81	87	89	92	89	6.1	6.3	6.3	6.1	6.3	6.3	6.2
Virginia.....	348	393	421	440	445	4.7	5.2	5.2	5.0	5.0	5.0	5.0
West Virginia.....	427	490	528	547	570	5.2	5.3	5.3	5.4	5.3	5.2	5.3
North Carolina.....	73	76	85	80	82	4.5	4.6	4.8	4.7	4.8	4.7	4.8
South Carolina.....	12	13	12	12	12	4.0	4.1	4.2	4.2	4.3	4.3	4.3
Georgia.....	35	36	34	33	33	3.2	3.4	3.6	3.4	3.4	3.4	3.4
Florida.....	46	42	40	38	37	3.0	3.0	3.0	3.0	3.1	3.0	3.0
South Atlantic.....	1,024	1,140	1,212	1,245	1,272	4.9	5.1	5.1	5.1	5.1	5.1	5.1
Kentucky.....	762	810	830	835	800	4.8	4.8	4.8	4.7	4.7	5.0	5.1
Tennessee.....	273	314	320	331	348	4.3	4.3	4.3	4.1	4.2	4.3	4.4
Alabama.....	48	50	52	47	42	3.3	3.5	3.6	3.5	3.5	3.4	3.4
Mississippi.....	80	80	83	83	83	3.2	3.2	3.2	3.2	3.3	3.3	3.3
Arkansas.....	46	44	42	42	44	4.7	4.7	4.7	4.6	4.5	4.3	4.5
Louisiana.....	100	115	130	125	123	3.3	3.2	3.3	3.2	3.2	3.4	3.0
Oklahoma.....	69	92	123	136	150	7.3	7.6	7.7	7.5	7.2	7.6	7.8
Texas.....	4,526	4,938	5,680	6,232	6,836	7.2	7.3	7.7	8.1	8.2	7.7	7.8
South Central.....	5,908	6,443	7,200	7,831	8,420	6.5	6.6	7.0	7.3	7.4	7.1	7.3
Montana.....	2,806	3,100	3,458	3,740	3,784	8.6	8.9	8.8	8.7	9.0	9.1	9.5
Idaho.....	1,330	1,394	2,040	2,040	2,134	8.3	8.9	8.8	9.2	8.9	8.9	9.1
Wyoming.....	2,973	3,100	3,155	3,264	3,600	8.8	8.5	8.9	9.0	8.4	9.1	9.6
Colorado.....	1,216	1,395	1,573	1,600	1,736	7.4	7.6	7.3	8.1	7.8	8.1	7.8
New Mexico.....	2,068	2,180	2,145	2,343	2,520	6.3	6.5	6.7	6.8	7.1	7.2	6.0
Arizona.....	1,000	950	970	940	960	6.1	6.1	6.2	6.1	6.0	6.0	6.0
Utah.....	2,350	2,480	2,430	2,600	2,620	8.6	9.1	8.9	9.3	8.5	9.4	8.8
Nevada.....	1,098	1,144	1,010	993	1,060	7.2	7.7	7.3	7.8	7.7	8.0	8.0
Washington.....	534	575	615	650	660	9.5	9.8	9.8	9.8	9.9	9.5	9.6
Oregon.....	2,060	2,210	2,271	2,375	2,500	8.8	9.3	8.8	9.2	8.6	9.0	8.8
California.....	3,290	3,469	3,472	3,694	3,887	7.4	7.2	7.3	7.2	7.4	7.8	7.2
Western.....	21,240	22,527	23,139	24,299	25,491	8.0	8.2	8.1	8.3	8.1	8.4	8.4
United States.....	37,426	39,717	41,948	44,438	46,401	7.6	7.7	7.7	7.9	7.8	7.9	8.0

Bureau of Agricultural Economics. All years shown, revised January, 1932.

<sup>1</sup> In States where sheep are shorn twice a year, principally Texas and California, this figure covers wool per head of sheep shorn and not weight per fleece.<sup>2</sup> Include fleeces taken at commercial feeding plants. California figures include some fleeces taken from early lambs.

TABLE 363.—Wool: *International trade, average 1925-1929, annual 1928-1930*

Country	Calendar year							
	Average 1925-1929		1928		1929		1930 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Australia <sup>1</sup> .....	739,123	3,990	715,028	6,280	704,760	3,819	851,762	2,393
Argentina.....	284,973	302	276,463	855	281,313	336	297,643	116
Union of South Africa.....	254,431	576	261,211	943	206,917	701	281,898	245
New Zealand.....	220,228	103	226,808	89	234,966	73	107,240	13
Uruguay.....	117,856	0	117,771	0	112,620	0	172,657	0
China.....	58,272	568	73,623	421	59,864	444	30,743	210
British India.....	50,373	27,843	57,649	32,093	56,774	26,128	32,198	14,461
Chile.....	26,196	435	20,689	584	23,519	554	20,051	72
Algeria.....	24,047	3,632	20,526	3,815	14,481	3,046	18,592	2,043
Morocco.....	13,345	0	13,038	0	7,195	0	4,024	0
Irish Free State.....	12,706	1,282	12,284	865	13,110	1,048	6,600	788
Persia <sup>1</sup> .....	11,918	1,380	12,192	974	11,713	1,212	1,039	1,648
Hungary.....	11,715	1,643	9,187	1,025	11,317	1,400	8,718	1,648
Brazil.....	11,021	1	10,160	11,992	11,992	1	10,228	0
Peru.....	10,760	1	12,411	2	10,569	4	7,151	0
Spain.....	9,715	4,918	7,523	6,809	10,074	6,111	6,051	7,320
Egypt and Sudan.....	3,987	4-127	3,630	4-221	4,790	4-236	2,288	4-81
Tunis.....	2,982	1,383	4,216	1,423	2,503	1,606	1,039	1,280
Total.....	1,873,658	47,929	1,866,706	56,663	1,931,473	46,901	1,954,879	30,508
PRINCIPAL IMPORTING COUNTRIES								
France.....	53,286	633,026	59,924	612,072	64,820	698,618	52,609	688,589
United Kingdom.....	54,037	473,061	48,007	462,691	51,984	503,232	32,661	513,619
Germany.....	24,109	361,447	26,542	380,649	24,973	376,437	23,384	347,966
United States.....	322	288,346	485	244,553	239	280,371	162	163,734
Belgium.....	19,091	135,887	24,778	144,701	35,955	171,261	33,192	163,156
Italy.....	7,188	99,134	8,368	106,919	6,398	120,248	4,314	119,588
Japan.....	0	93,489	0	110,194	0	107,429	0	115,025
Russia.....	<sup>2</sup> 4,024	46,005	<sup>1</sup> 179	82,269	<sup>1</sup> 112	86,429	<sup>1</sup> 0	72,139
Czechoslovakia.....	3,381	35,889	3,195	37,922	3,164	43,454	1,813	39,530
Poland.....	1,398	30,265	1,645	30,487	908	35,008	834	32,403
Switzerland.....	45	17,404	35	17,202	47	17,827	50	16,790
Austria.....	973	16,490	832	16,456	499	19,506	390	16,472
Canada.....	7,307	13,930	8,251	14,271	6,090	12,088	4,382	9,459
Sweden.....	241	10,826	374	11,829	274	12,512	234	10,562
Netherlands.....	2,830	10,518	2,924	10,457	3,244	12,119	2,268	16,786
Yugoslavia.....	117	5,589	243	3,017	142	4,578	67	7,269
Rumania.....	1,287	<sup>1</sup> 4,011	<sup>1</sup> 1,636	-----	<sup>2</sup> 2,393	<sup>1</sup> 3,305	<sup>1</sup> 262	<sup>1</sup> 3,860
Denmark.....	355	2,808	534	2,730	269	3,656	94	3,299
Finland.....	-----	2,806	-----	3,531	-----	2,587	-----	2,072
Bulgaria.....	3	2,699	11	2,715	0	3,760	<sup>1</sup> 35	2,712
Greece.....	641	2,063	523	1,477	616	2,615	624	2,803
Norway.....	601	1,812	1,118	1,717	641	1,542	214	1,771
Total.....	181,236	2,287,557	199,489	2,303,859	212,708	2,508,570	157,089	2,352,004

Bureau of Agricultural Economics. Official sources except where otherwise noted. "Wool" in this table includes washed, unwashed, scoured, pulled wool, slip, also hair—camel's, mohair, angora goat, cashmere goat, and alpaca. The following items have been considered as not within this classification: Carved, combed, dyed wool, flecks; sheep, lamb and goat skins with hair on, mill waste, nolls and tops.

<sup>1</sup>Preliminary.

<sup>2</sup>International Yearbook of Agricultural Statistics.

<sup>3</sup>Figures for Persia are for 12 months ended Mar. 21 of the year following year shown.

<sup>4</sup>Excess of reexports over imports.

<sup>5</sup>4-year average.

TABLE 367.—Wool, shorn: *Estimated average price per pound received by producers United States, 1922-1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weight- ed aver- age
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1922.....	18.0	22.3	25.0	24.8	29.0	32.8	32.5	31.0	31.6	32.2	33.2	35.3	29.8
1923.....	35.3	35.3	37.3	39.2	41.7	41.5	38.3	37.0	37.1	36.9	36.4	36.2	38.9
1924.....	36.6	37.5	38.2	38.4	37.4	36.0	34.3	33.5	35.5	37.3	40.1	42.2	36.9
1925.....	42.8	43.2	43.0	40.8	36.9	35.7	39.4	38.1	37.8	37.2	37.8	39.5	38.5
1926.....	38.9	37.7	34.7	33.2	32.0	31.4	31.9	31.9	32.6	31.6	31.6	30.1	32.5
1927.....	30.9	31.1	31.3	30.4	30.1	30.2	30.7	31.2	31.2	30.9	31.1	32.0	30.7
1928.....	33.2	34.4	35.4	35.6	37.0	38.7	37.6	37.0	36.5	36.0	35.9	35.6	36.7
1929.....	35.9	35.9	35.5	33.8	31.3	30.2	29.4	29.2	29.0	28.6	28.5	27.8	30.9
1930.....	27.4	25.9	23.7	21.4	19.6	19.2	19.2	19.8	20.2	19.6	19.0	18.4	20.3
1931.....	17.4	16.4	15.9	15.6	14.4	13.0	12.7	13.1	13.2	12.5	13.1	12.9	13.9

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by number of sheep Jan. 1, to obtain a price for the United States; yearly price obtained by using estimates of the division of crop and livestock estimates and the division of statistical and historical research.

TABLE 368.—Wool: Boston market: *Average price per pound, 1922-1931*

SCOURED BASIS, TERRITORY, GRADES 64's, 70's, 80's (FINE STRICTLY COMBING)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Aver- age
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1922.....	97	110	110	109	127	134	135	131	130	134	139	140	125
1923.....	143	144	144	149	153	150	144	137	132	130	130	134	141
1924.....	139	139	142	138	135	129	130	137	142	147	154	164	141
1925.....	168	164	153	138	126	130	137	132	129	128	131	131	139
1926.....	127	124	118	116	112	110	116	116	116	116	114	110	116
1927.....	110	110	110	109	108	108	111	111	111	112	112	112	110
1928.....	116	116	116	117	119	120	120	115	112	112	113	114	116
1929.....	114	110	108	104	100	97	94	94	93	90	88	84	98
1930.....	82	79	78	76	75	76	76	76	76	75	73	72	76
1931.....	68	66	66	66	64	62	62	64	62	59	59	59	63

SCOURED BASIS, TERRITORY, GRADE 56's (THREE-EIGHTHS BLOOD STRICTLY COMBING)

1922.....	63	76	77	74	83	88	88	90	92	95	99	98	85
1923.....	100	103	105	107	111	111	109	105	103	101	104	108	106
1924.....	113	116	116	113	109	97	100	109	113	117	122	133	113
1925.....	136	138	125	109	96	99	105	101	102	102	108	109	110
1926.....	103	99	93	91	89	89	90	90	91	93	93	91	92
1927.....	90	90	90	90	88	88	90	91	91	94	94	94	91
1928.....	97	99	100	106	107	108	107	103	104	104	104	104	104
1929.....	104	104	101	95	89	88	88	90	90	89	87	82	92
1930.....	75	70	67	64	62	62	62	62	62	60	59	58	63
1931.....	55	52	51	51	48	46	49	51	51	48	48	48	50

GREASE BASIS, OHIO AND SIMILAR, GRADE 56's (THREE-EIGHTHS BLOOD STRICTLY COMBING)

1922.....	36	39	40	38	42	47	46	46	47	49	53	54	45
1923.....	55	56	56	56	56	57	56	54	53	52	53	54	55
1924.....	55	56	57	55	53	49	48	53	55	59	63	69	56
1925.....	70	69	66	55	46	49	53	52	50	52	54	54	56
1926.....	54	53	49	46	44	43	44	44	44	45	46	45	46
1927.....	45	45	45	44	42	42	43	44	45	46	47	48	45
1928.....	50	52	52	53	55	57	56	55	55	55	56	56	54
1929.....	55	55	54	50	45	44	45	45	45	45	44	42	48
1930.....	39	36	34	32	29	30	30	30	30	30	29	28	31
1931.....	26	25	24	23	22	22	22	23	24	24	24	24	24

Bureau of Agricultural Economics. 1922-1923 average of weekly range quotations from the Boston Commercial Bulletin, and 1924-1931 prices from the livestock and meat reporting service of the bureau.

**TABLE 369.—Goats and mohair: Estimates <sup>1</sup> of goats clipped, mohair clipped, and average clip per goat (principal producing States), 1920-1931**

**GOATS CLIPPED**

State	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>
Texas <sup>2</sup> .....	1,834	1,984	1,750	1,797	2,008	2,020	2,550	2,640	3,070	3,200	3,518	3,570
New Mexico.....	124	128	110	110	127	120	135	165	170	186	209	236
Arizona.....	145	145	152	160	165	162	165	185	190	200	225	250
California.....	72	74	89	87	87	88	56	52	44	42	40	39
Oregon.....	113	115	105	103	101	110	115	115	125	120	120	115
Missouri.....	58	60	55	53	60	61	61	63	66	66	67	68
Total.....	2,346	2,506	2,231	2,280	2,518	2,531	3,082	3,220	3,665	3,814	4,179	4,278

**MOHAIR (INCLUDING KID HAIR) PRODUCED**

	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>
Texas.....	6,786	7,607	6,838	7,352	7,996	9,100	10,700	11,600	13,500	14,155	14,800	16,400
New Mexico.....	397	422	352	374	457	444	473	611	629	717	815	933
Arizona.....	464	479	517	580	611	599	594	708	741	800	900	1,000
California.....	230	244	207	211	217	220	207	187	158	147	140	136
Oregon.....	452	480	431	422	414	462	483	493	525	492	480	472
Missouri.....	145	150	143	148	162	171	171	178	178	165	168	170
Total.....	8,474	9,362	8,498	9,067	9,857	10,996	12,628	13,760	15,731	16,476	17,303	19,111

**AVERAGE CLIP PER GOAT CLIPPED <sup>1</sup>**

	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>
Texas.....	3.7	3.8	3.9	4.1	4.0	4.5	4.2	4.4	4.4	4.4	4.2	4.6
New Mexico.....	3.2	3.3	3.2	3.4	3.6	3.7	3.5	3.7	3.7	3.9	3.9	4.0
Arizona.....	3.2	3.3	3.4	3.5	3.7	3.7	3.6	3.8	3.9	4.0	4.0	4.0
California.....	3.2	3.3	3.5	3.7	3.8	3.8	3.7	3.6	3.6	3.5	3.5	3.5
Oregon.....	4.0	4.0	4.1	4.1	4.1	4.2	4.2	4.2	4.2	4.1	4.0	4.1
Missouri.....	2.5	2.5	2.6	2.8	2.7	2.8	2.8	2.8	2.7	2.5	2.5	2.5
Average, 6 States.....	3.6	3.7	3.8	4.0	3.9	4.3	4.1	4.3	4.3	4.3	4.1	4.5

Bureau of Agricultural Economics.

<sup>1</sup> Figures for 1925-1930 are revisions of department's estimates previously published.

<sup>2</sup> Most goats clipped twice a year. In Texas, kids are clipped in the fall of year of birth. Figures include both goats and kids clipped.

<sup>3</sup> In States where goats are clipped twice a year figures include both spring and fall clip.

**TABLE 370.—Imported meat and meat products, federally inspected and passed, United States, 1921-22 to 1930-31**

Year beginning July 1—	Chilled and frozen fresh meats		Canned and cured meats	Other meat products	Total weight
	Beef	Other			
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
1921-22.....	16,875,389	18,938,148	5,101,704	998,195	41,913,436
1922-23.....	25,996,968	12,871,384	9,635,315	1,341,067	49,847,714
1923-24.....	18,108,128	8,489,138	10,648,605	1,391,060	38,633,931
1924-25.....	5,612,600	41,827,557	12,857,043	2,877,640	33,174,840
1925-26.....	9,975,359	12,402,280	19,258,401	3,144,968	44,780,958
1926-27.....	14,958,143	22,508,681	43,714,607	5,454,741	86,634,172
1927-28.....	38,168,121	18,880,547	63,189,480	12,102,635	132,340,783
1928-29.....	63,085,288	15,704,658	89,511,853	11,563,215	169,865,014
1929-30.....	23,909,708	6,783,637	88,128,169	8,065,195	136,886,709
1930-31.....	2,612,713	1,314,170	23,854,583	5,651,509	33,422,975

Bureau of Animal Industry.

TABLE 371.—*Livestock: Number of animals slaughtered at federally inspected plants and number of whole carcasses condemned,<sup>1</sup> 1921-22 to 1930-31*

Year beginning July—	Cattle		Calves		Sheep		Goats		Swine		Horses		Total slaughtered
	Slaughter	Condemned	Slaughter	Condemned	Slaughter	Condemned	Slaughter	Condemned	Slaughter	Condemned	Slaughter	Condemned	
	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands
1921-22-----	7,871	55.2	3,924	11.4	11,968	10.5	14	0.0	39,416	160.1	2	0.0	63,196
1922-23-----	9,030	73.3	4,338	11.8	11,404	13.3	25	.1	48,600	196.3	1	.0	73,398
1923-24-----	9,189	83.9	4,668	12.7	11,505	12.9	31	.3	54,416	232.7	5	.0	79,814
1924-25-----	9,774	92.1	5,185	11.1	12,203	12.7	27	.1	48,480	180.4	12	.0	75,660
1925-26-----	10,098	103.6	5,312	11.9	12,354	14.5	43	.1	40,443	143.0	40	.1	68,280
1926-27-----	10,060	83.5	5,060	10.6	12,894	16.4	30	.1	42,650	173.6	48	.2	70,747
1927-28-----	9,040	69.4	4,774	9.9	12,984	15.4	20	.1	48,347	154.2	107	.3	75,273
1928-29-----	8,284	61.9	4,526	8.9	13,769	20.1	21	.1	47,164	139.4	117	.4	73,881
1929-30-----	8,281	59.5	4,491	9.5	15,307	22.9	22	.1	46,689	135.4	136	.5	74,626
1930-31-----	8,209	52.4	4,732	9.1	17,300	18.5	9	.1	44,021	121.8	135	.7	74,406

Bureau of Animal Industry.

<sup>1</sup> The numbers of condemned carcasses are expressed in thousands and tenths; that is, the last figure represents hundreds.TABLE 372.—*Meat and meat products prepared under Federal inspection, 1921-22 to 1930-31*

Year beginning July—	Pork placed in cure	Sausage	Canned meats	Lard	Lard compounds and substitutes	Oleo products	Oleo-mar-garine	All other products	Total
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
1921-22-----	2,725,031	568,626	109,481	1,659,331	312,014	208,034	118,197	1,666,408	7,427,117
1922-23-----	3,386,258	679,317	180,282	2,017,763	336,851	278,137	129,768	1,920,171	8,888,547
1923-24-----	3,502,368	707,323	183,260	2,110,060	363,320	259,008	142,881	2,136,020	9,404,840
1924-25-----	3,176,714	736,877	214,660	1,733,933	458,518	287,271	133,836	2,170,278	8,912,077
1925-26-----	2,850,675	771,741	214,166	1,698,754	543,913	275,636	148,331	2,007,854	8,411,070
1926-27-----	2,920,206	765,074	248,459	1,691,344	535,175	280,641	148,384	1,971,827	8,561,110
1927-28-----	3,036,063	778,311	255,379	1,846,796	472,539	237,506	152,085	2,201,033	8,980,912
1928-29-----	2,992,898	785,463	285,808	1,817,601	467,077	228,531	153,861	2,210,438	8,946,607
1929-30-----	2,981,884	783,629	303,094	1,807,144	433,485	223,869	159,413	2,268,407	8,960,935
1930-31-----	2,851,938	697,708	283,547	1,662,397	482,482	212,925	117,819	2,135,789	8,444,695

Bureau of Animal Industry. The above figures do not represent production, as a product may be inspected more than once in course of further manufacture.

**BEEF CATTLE, HOGS, SHEEP, HORSES, MULES, ETC. 815**

**TABLE 373.—Meat and meat products: International trade, average 1925-1929, annual 1928-1930**

Country	Calendar year							
	Average 1925-1929		1928		1929		1930 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
<b>PRINCIPAL EXPORTING COUNTRIES</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
Argentina.....	2,028,126	465	1,751,434	613	1,701,510	427	1,552,620	323
United States.....	1,421,054	147,765	1,335,802	194,161	1,448,801	217,795	1,183,014	97,765
Denmark.....	640,468	26,692	721,893	28,549	681,512	28,429	875,694	28,156
Netherlands.....	534,982	206,537	558,807	180,100	458,530	158,485	438,879	175,253
New Zealand.....	442,571	1,102	494,525	1,062	428,335	1,198	514,666	1,027
Uruguay.....	396,117	15	341,890	0	338,659	0	402,247	0
Australia <sup>2</sup> .....	380,162	6,691	311,561	8,425	383,319	7,808	344,543	4,212
Canada.....	144,720	27,305	116,352	27,179	81,528	40,774	35,045	39,835
Brazil.....	131,003	10,511	178,052	10,106	201,914	6,417	288,230	6,953
Irish Free State.....	105,959	66,964	135,551	57,194	110,625	59,541	90,303	61,470
Poland.....	71,019	45,836	64,673	68,364	68,938	55,447	108,227	39,861
Sweden.....	61,961	48,886	68,596	44,111	63,262	48,848	87,300	50,825
China.....	48,376	3,672	44,153	4,385	41,082	4,000	43,908	3,563
Chile.....	40,829	4,206	46,582	1,104	44,991	2,942	39,452	-----
Hungary.....	33,182	6,733	14,864	10,644	18,691	2,195	32,709	3,684
Yugoslavia.....	27,751	9,664	21,205	10,494	22,364	12,983	15,686	10,284
Union of South Africa.....	24,581	15,658	19,090	16,640	27,495	15,687	32,102	11,886
Rumania.....	21,049	* 1,037	* 11,812	(?)	* 13,765	* 6	* 19,093	* 4
<b>Total.....</b>	<b>6,553,910</b>	<b>627,737</b>	<b>6,234,822</b>	<b>663,131</b>	<b>6,134,411</b>	<b>662,979</b>	<b>6,101,596</b>	<b>534,580</b>
<b>Total beef.....</b>	<b>2,872,975</b>	<b>251,128</b>	<b>2,556,147</b>	<b>254,535</b>	<b>2,434,220</b>	<b>228,233</b>	<b>2,464,614</b>	<b>183,771</b>
<b>Total pork.....</b>	<b>2,274,327</b>	<b>150,315</b>	<b>2,347,847</b>	<b>162,847</b>	<b>2,272,588</b>	<b>147,748</b>	<b>2,146,303</b>	<b>128,259</b>
<b>Total mutton and lamb.....</b>	<b>607,310</b>	<b>1,430</b>	<b>582,960</b>	<b>1,122</b>	<b>633,358</b>	<b>962</b>	<b>736,033</b>	<b>794</b>
<b>Total unclassified.....</b>	<b>799,298</b>	<b>224,864</b>	<b>747,868</b>	<b>244,637</b>	<b>794,235</b>	<b>286,086</b>	<b>754,586</b>	<b>221,756</b>
<b>Total.....</b>	<b>6,553,910</b>	<b>627,737</b>	<b>6,234,822</b>	<b>663,131</b>	<b>6,134,411</b>	<b>662,979</b>	<b>6,101,596</b>	<b>534,580</b>
<b>PRINCIPAL IMPORTING COUNTRIES</b>								
United Kingdom.....	127,797	3,827,365	114,738	3,855,378	112,301	3,708,244	140,094	3,894,405
Germany.....	42,080	888,653	48,022	703,269	55,142	670,475	78,441	570,656
France.....	62,427	299,085	77,572	229,425	73,158	176,678	67,952	270,028
Italy.....	18,680	233,627	13,027	215,229	10,866	230,546	14,482	206,397
Belgium.....	60,122	213,736	56,402	168,075	39,684	184,671	36,423	194,705
Cuba.....	750	180,592	1,465	177,609	2,285	168,102	2,231	132,935
Austria.....	8,495	124,462	11,413	127,582	9,915	121,616	9,909	105,192
Czechoslovakia.....	9,837	101,778	10,544	85,941	10,602	100,048	8,634	83,045
Japan.....	115	68,636	868	68,918	208	70,088	138	71,263
Mexico.....	7,200	65,814	6,085	87,376	4,017	2,520	1,135	95,349
Norway.....	3,107	35,970	3,552	33,640	3,957	30,705	2,779	28,261
Spain.....	6,116	31,148	3,263	31,239	2,719	34,883	5,342	27,308
Switzerland.....	3,383	30,242	3,335	30,850	3,253	31,468	3,019	30,469
Finland.....	4,565	19,972	1,819	26,477	1,297	20,245	2,943	13,519
Philippine Islands.....	0	19,812	0	19,767	0	21,607	0	14,845
British Malaya.....	2,336	15,306	2,563	16,529	2,249	16,323	1,985	13,628
British India.....	1,254	13,250	1,390	11,158	1,247	12,813	978	12,819
Peru.....	590	12,912	1,180	10,707	1,194	11,029	1,728	-----
Algeria.....	1,820	12,537	2,122	13,082	1,644	13,040	1,399	14,119
Egypt.....	144	7,603	132	8,070	147	8,599	108	4,689
<b>Total.....</b>	<b>360,818</b>	<b>6,153,520</b>	<b>358,992</b>	<b>5,920,321</b>	<b>335,890</b>	<b>5,633,700</b>	<b>379,780</b>	<b>5,783,627</b>
<b>Total beef.....</b>	<b>126,843</b>	<b>2,096,113</b>	<b>125,886</b>	<b>2,465,322</b>	<b>105,541</b>	<b>2,254,639</b>	<b>160,937</b>	<b>2,241,949</b>
<b>Total pork.....</b>	<b>32,932</b>	<b>2,133,324</b>	<b>29,532</b>	<b>2,172,953</b>	<b>27,623</b>	<b>2,095,668</b>	<b>34,832</b>	<b>2,138,210</b>
<b>Total mutton and lamb.....</b>	<b>4,185</b>	<b>680,356</b>	<b>3,027</b>	<b>688,845</b>	<b>2,715</b>	<b>701,848</b>	<b>5,846</b>	<b>790,005</b>
<b>Total unclassified.....</b>	<b>196,808</b>	<b>613,727</b>	<b>200,547</b>	<b>593,201</b>	<b>200,111</b>	<b>583,550</b>	<b>178,465</b>	<b>617,468</b>
<b>Total.....</b>	<b>360,818</b>	<b>6,153,520</b>	<b>358,992</b>	<b>5,920,321</b>	<b>335,890</b>	<b>5,633,700</b>	<b>379,780</b>	<b>5,783,627</b>

Bureau of Agricultural Economics. Official sources except where otherwise noted.

<sup>1</sup> Preliminary.

<sup>2</sup> International Yearbook of Agricultural Statistics.

<sup>3</sup> Year ended June 30.

<sup>4</sup> 4-year average.

TABLE 374.—Meats, western dressed, fresh and smoked: Average wholesale price per 100 pounds at Chicago and New York, by years, 1929-1931

## BEEF AND VEAL

Year	Chicago							New York						
	Steer beef					Cow beef, Good	Vealers, <sup>1</sup> Good	Steer beef					Cow beef, Good	Vealers, <sup>1</sup> Good
	Choice		Good		Medium, 500 pounds up			Choice		Good		Medium, 500 pounds up		
	700 pounds up	550 to 700 pounds	700 pounds up	550 to 700 pounds				700 pounds up	550 to 700 pounds	700 pounds up	550 to 700 pounds			
1929	Dolla. 21.93	Dolla. 22.67	Dolla. 20.71	Dolla. 21.28	Dolla. 18.96	Dolla. 17.28	Dolla. 22.86	Dolla. 22.96	Dolla. 23.22	Dolla. 21.49	Dolla. 21.60	Dolla. 19.17	Dolla. 17.94	Dolla. 24.08
1930	18.83	19.64	17.16	17.45	15.34	13.68	17.90	19.53	19.95	17.86	18.16	15.77	14.56	20.39
1931	14.51	15.10	13.01	13.40	11.18	9.96	12.79	15.38	15.67	13.69	13.99	11.54	10.43	15.10

## PORK CUTS

Year	Chicago						New York					
	Fresh pork			Cured pork and lard			Fresh pork			Cured pork and lard		
	Ham, 10 to 14 pounds	Loins, 12 to 15 pounds	Shoulders, New York style, skinned, 8 to 12 pounds	Hams, smoked, regular, No. 2, 14 to 16 pounds	Bacon, No. 1, smoked, dry cure, 6 to 8 pounds	Lard, refined (hard-wood tubs)	Ham, 10 to 14 pounds	Loins, 12 to 15 pounds	Shoulders, New York style, skinned, 8 to 12 pounds	Hams, smoked, regular, No. 2, 10 to 12 pounds	Bacon, No. 1, smoked sweet-pickle cure, 8 to 10 pounds	Lard, refined (hard-wood tubs)
1929	Dolls. 21.29	Dolls. 21.17	Dolls. 16.07	Dolls. 24.10	Dolls. 30.16	Dolls. 12.97	Dolls. 23.12	Dolls. 31.06	Dolls. 17.73	Dolls. 23.58	Dolls. 22.21	Dolls. 13.70
1930	19.66	19.61	15.36	23.08	30.53	12.02	22.40	20.40	18.74	22.64	23.39	12.57
1931	12.99	14.00	10.05	16.76	24.30	9.02	16.12	15.00	11.91	17.61	18.41	9.84

## LAMB AND MUTTON

Year	Chicago							New York						
	Lamb						Mutton, Good, 70 pounds down	Lamb						Mutton, Good, 70 pounds down
	Choice		Good		Medium, 38 pounds down	Common, 38 pounds down		Choice		Good		Medium, 38 pounds down	Common, 38 pounds down	
	38 pounds down	39 to 45 pounds	38 pounds down	39 to 45 pounds				38 pounds down	39 to 45 pounds	38 pounds down	39 to 45 pounds			
1929	Dolls. 37.73	Dolls. 27.44	Dolls. 26.57	Dolls. 26.30	Dolls. 24.70	Dolls. 22.57	Dolls. 14.78	Dolls. 28.58	Dolls. 27.75	Dolls. 27.20	Dolls. 26.52	Dolls. 25.47	Dolls. 23.61	Dolls. 14.65
1930	21.18	20.69	19.58	19.22	17.33	14.76	10.83	21.88	21.34	20.75	20.26	19.00	17.08	11.33
1931	17.51	17.24	16.04	15.78	14.07	12.00	8.62	18.17	17.88	16.89	16.63	15.29	13.11	9.15

Bureau of Agricultural Economics. Compiled from data of the livestock and meat-reporting service of the bureau. Earlier data in 1927 Yearbook, pp. 1050-1055, and in 1928 Yearbook, pp. 984-986.

<sup>1</sup> Hide on

TABLE 375.—*Hides, packer: Average price per pound at Chicago, 1922-1931*

Calendar year	Steers					Cows			Bulls	
	Heavy native	Heavy Texas	Light Texas	Butt branded	Colo- branded	Heavy native	Light native	Branded	Native	Branded
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1922.....	17.83	16.57	15.29	16.51	15.59	16.10	15.16	13.47	11.96	10.15
1923.....	16.46	14.79	13.77	14.89	13.86	14.21	12.94	11.11	11.69	9.89
1924.....	14.67	13.82	12.80	13.80	12.79	12.95	12.29	10.41	10.14	8.79
1925.....	15.96	15.08	14.06	15.16	14.12	14.82	14.62	13.30	11.98	10.29
1926.....	14.08	13.38	12.67	13.34	12.82	12.71	13.11	12.05	9.98	8.50
1927.....	19.28	18.21	17.49	18.23	17.74	18.08	18.66	17.28	14.09	12.88
1928.....	23.85	22.91	22.26	22.95	22.26	22.96	22.63	21.79	17.64	16.62
1929.....	16.98	16.08	15.16	16.11	15.39	15.86	15.75	14.86	11.42	10.17
1930.....	13.87	13.76	12.55	13.73	13.18	11.78	11.71	11.19	8.30	7.30
1931.....	9.06	8.96	8.34	8.96	8.48	8.04	8.43	7.76	5.53	4.78

Bureau of Agricultural Economics. Compiled from annual reports of the Chicago Board of Trade Data 1893-1919 available in 1925 Yearbook, p. 1199, Table 610.

TABLE 376.—*Hides, country: Average price per pound at Chicago, 1922-1931*

Calendar year	Ex- tremes	Heavy steers	Heavy cows	No. 1 buffs	No. 2 buffs	Bulls	Country packer brands	Country brands	No. 1 calif- skins	No. 1 kip- skins
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1922.....	12.93	12.03	10.85	10.86	9.52	8.23	12.53	8.42	18.95	17.29
1923.....	11.65	11.39	10.43	10.45	9.26	8.93	10.12	8.70	17.18	15.42
1924.....	11.86	11.31	9.24	9.63	8.63	7.86	9.81	8.23	20.39	16.62
1925.....	14.41	12.94	11.64	12.26	11.25	9.46	12.52	10.54	21.88	18.12
1926.....	13.46	11.63	9.54	10.70	9.70	8.03	10.52	9.00	18.02	16.12
1927.....	18.60	16.02	14.85	16.26	15.26	11.49	15.54	13.89	20.47	19.96
1928.....	22.04	18.53	18.05	19.71	18.71	14.88	19.18	17.38	27.84	25.23
1929.....	14.98	12.09	11.55	12.82	11.82	8.92	11.88	10.80	20.72	18.72
1930.....	11.18	8.50	8.40	9.14	8.14	5.90	9.49	7.73	17.43	15.92
1931.....	7.77	6.02	5.61	6.32	5.32	3.99	6.70	5.05	11.81	10.42

Bureau of Agricultural Economics. Compiled from annual reports of the Chicago Board of Trade.

TABLE 377.—*Meats and lard: Estimated total production and per capita consumption in United States*

Calendar year	Production					Per capita consumption					
	Beef	Veal	Lamb and mutton	Pork (excl. lard)	Lard	Beef	Veal	Lamb and mutton	Pork (excl. lard)	Total meats	Lard
	<i>Million pounds</i>	<i>Million pounds</i>	<i>Million pounds</i>	<i>Million pounds</i>	<i>Million pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
1900.....	5,694	285	517	5,912	1,617	67.8	3.5	6.8	64.7	142.8	13.2
1901.....	5,919	305	538	5,895	1,614	69.0	3.9	6.9	63.0	142.8	12.9
1902.....	5,922	346	561	5,334	1,439	68.5	4.4	7.0	57.8	137.7	11.7
1903.....	6,689	384	582	5,465	1,496	76.0	4.7	7.2	59.3	147.2	11.8
1904.....	6,548	425	564	5,867	1,596	73.6	5.1	6.8	62.8	148.3	12.4
1905.....	6,680	455	545	5,748	1,551	73.0	5.4	6.5	58.8	143.7	10.0
1906.....	6,711	464	555	5,976	1,644	72.6	5.4	6.5	59.7	144.2	11.2
1907.....	7,192	589	500	6,333	1,777	77.5	6.7	6.4	64.4	155.1	13.5
1908.....	6,642	573	559	6,617	1,790	71.5	6.4	6.3	66.1	150.3	13.5
1909.....	7,041	628	608	6,024	1,504	75.4	6.9	6.6	60.1	149.2	11.5
1910.....	6,703	632	598	5,649	1,434	71.1	6.8	6.4	57.1	141.6	11.4
1911.....	6,466	597	732	6,596	1,673	67.7	6.4	7.3	64.5	146.5	11.3
1912.....	5,888	598	779	6,407	1,626	61.1	6.3	8.1	61.8	137.4	11.2
1913.....	5,881	491	731	6,522	1,681	60.6	5.1	7.5	63.0	136.3	11.4
1914.....	5,606	443	712	6,630	1,667	58.5	4.6	7.4	62.3	133.0	12.2
1915.....	5,779	427	622	6,971	1,775	54.5	4.3	6.3	59.5	124.8	12.9
1916.....	6,075	535	608	7,386	1,849	56.0	5.3	6.1	60.1	127.7	13.6
1917.....	6,641	661	473	6,139	1,587	59.5	6.5	4.6	49.3	120.1	11.7
1918.....	7,279	764	493	7,854	1,983	63.0	7.4	4.7	54.8	130.1	13.3
1919.....	6,758	803	608	7,332	2,039	61.6	7.7	5.8	54.8	130.0	12.3
1920.....	6,713	797	532	7,455	2,066	63.1	7.6	5.5	60.5	136.8	13.3
1921.....	6,163	747	626	7,645	2,114	56.9	7.0	5.9	63.5	133.3	11.3
1922.....	6,706	792	535	8,260	2,357	60.4	7.3	5.0	66.1	138.8	14.2
1923.....	6,873	862	571	9,595	2,753	61.4	7.7	5.2	74.7	149.0	15.3
1924.....	7,065	928	589	9,279	2,746	61.6	8.2	5.2	74.7	149.7	15.4
1925.....	7,146	1,001	599	8,255	2,223	62.2	8.7	5.2	67.6	143.7	13.2
1926.....	7,468	960	643	8,181	2,324	63.6	8.2	5.5	65.7	143.0	13.5
1927.....	6,826	867	645	8,533	2,356	58.4	7.4	5.4	68.5	130.7	13.8
1928.....	6,082	814	671	9,387	2,594	51.7	6.8	5.6	73.9	138.0	14.7
1929.....	6,065	810	699	9,223	2,598	51.4	6.8	5.8	72.8	136.8	14.3
1930.....	6,076	833	820	8,809	2,344	50.1	6.8	6.6	68.2	131.7	13.8

Bureau of Agricultural Economics.

TABLE 378.—*Horses and mules: Number and value on farms in the United States, January 1, 1910–1932*

Year	Horses			Mules		
	Number	Value per head	Farm value	Number	Value per head	Farm value
	<i>Thousands</i>	<i>Dollars</i>	<i>1,000 dollars</i>	<i>Thousands</i>	<i>Dollars</i>	<i>1,000 dollars</i>
1910.....	19,833	103.03	2,142,524	4,210	120.20	509,049
1911.....	20,277	111.46	2,259,081	4,323	125.92	544,359
1912.....	20,509	105.94	2,172,094	4,362	120.51	525,657
1913.....	20,567	110.77	2,276,222	4,386	124.31	545,245
1914.....	20,962	109.32	2,291,638	4,449	123.85	551,017
1915.....	21,195	103.33	2,190,102	4,479	112.36	503,271
1916.....	21,159	101.60	2,149,780	4,593	113.83	522,334
1917.....	21,210	102.89	2,182,307	4,723	118.15	558,006
1918.....	21,555	104.24	2,246,870	4,873	128.81	627,679
1919.....	21,452	98.45	2,114,807	4,954	135.83	672,022
1920.....	20,092	96.48	1,936,447	5,656	148.25	838,530
1921.....	19,366	84.54	1,637,181	5,772	117.37	677,475
1922.....	18,760	71.05	1,332,822	5,827	88.99	518,558
1923.....	18,123	70.51	1,277,873	5,895	86.86	512,007
1924.....	17,365	65.42	1,135,967	5,908	85.89	507,435
1925.....	16,640	64.28	1,069,654	5,918	82.91	490,668
1926.....	16,067	65.32	1,049,442	5,908	81.51	481,153
1927.....	15,365	63.74	979,500	5,801	74.50	432,181
1928.....	14,768	66.68	984,783	5,647	70.79	450,585
1929.....	14,203	60.63	988,953	5,496	82.39	452,825
1930.....	13,684	69.88	955,984	5,366	83.76	449,480
1931.....	13,165	60.43	795,541	5,215	99.17	360,736
1932 <sup>1</sup> .....	12,679	53.37	676,698	5,082	60.69	308,440

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

Figures for earlier years are shown in 1923 yearbook. Figures for the years 1920–1931 were revised January, 1932.

<sup>1</sup> Preliminary.TABLE 379.—*Horses: Price per head received by producers, United States, 1922–1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weighted average
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1922.....	82	84	86	87	89	88	88	86	84	81	79	79	84
1923.....	81	85	85	88	88	87	85	83	82	80	78	75	82
1924.....	73	74	75	76	78	77	77	79	78	77	76	73	76
1925.....	73	78	81	83	82	81	81	80	77	77	75	74	75
1926.....	75	80	82	84	83	83	82	80	78	77	75	73	79
1927.....	73	77	79	80	81	80	80	80	78	76	75	75	78
1928.....	77	82	85	85	86	86	85	84	82	80	79	78	82
1929.....	77	79	83	85	85	84	84	82	82	79	78	77	81
1930.....	77	77	78	79	79	77	73	70	69	68	66	64	80
1931.....	65	67	69	69	69	67	64	62	60	58	57	56	65

Bureau of Agricultural Economics. Based on returns from special-price reporters. Monthly prices, by states, weighted by number of horses Jan. 1, to obtain a price for the United States; yearly prices obtained by weighting monthly prices by receipts at public stockyards.

TABLE 380.—*Mules: Price per head received by producers, United States, 1926–1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weighted average
1926.....	\$92	\$96	\$97	\$100	\$99	\$99	\$96	\$95	\$94	\$90	\$85	\$85	\$94
1927.....	88	88	91	92	91	92	91	90	90	90	91	91	90
1928.....	93	97	100	102	102	102	101	100	96	96	94	93	96
1929.....	94	96	99	101	101	100	99	96	96	96	94	93	96
1930.....	93	94	95	96	95	94	88	80	78	78	77	74	91
1931.....	74	76	78	80	79	77	73	70	67	65	65	63	74

Bureau of Agricultural Economics. Based on returns of special-price reporters. Monthly prices by States, weighted by number of mules Jan. 1, to obtain a price for the United States.

TABLE 381.—*Horses and horse colts: Estimated number on farms and value per head, by States, January 1, 1928-1932*

State and division	Number					Value per head <sup>1</sup>				
	1928 <sup>2</sup>	1929 <sup>2</sup>	1930 <sup>2</sup>	1931 <sup>2</sup>	1932 <sup>2</sup>	1928	1929	1930	1931	1932
	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Dol- lars	Dol- lars	Dol- lars	Dol- lars	Dol- lars
Maine.....	74	87	83	58	87	135.00	140.00	143.00	115.00	114.00
New Hampshire.....	26	23	21	19	18	120.00	121.00	127.00	113.00	95.00
Vermont.....	56	55	53	51	50	119.00	124.00	131.00	106.00	102.00
Massachusetts.....	33	29	28	24	24	135.00	130.00	135.00	123.00	108.00
Rhode Island.....	5	4	4	4	4	135.00	130.00	140.00	135.00	100.00
Connecticut.....	27	24	22	21	21	140.00	145.00	147.00	137.00	110.00
New York.....	399	349	325	312	303	116.00	121.00	128.00	115.00	107.00
New Jersey.....	47	44	40	37	35	109.00	114.00	124.00	112.00	102.00
Pennsylvania.....	350	331	317	309	297	112.00	116.00	120.00	108.00	104.00
North Atlantic.....	987	926	871	836	809	117.34	122.51	126.90	112.82	105.41
Ohio.....	542	530	504	484	469	101.00	105.00	107.00	93.00	87.00
Indiana.....	517	484	456	438	425	82.00	82.00	82.00	76.00	73.00
Illinois.....	882	856	830	805	773	74.00	77.00	79.00	69.00	60.00
Michigan.....	420	404	389	381	373	98.00	110.00	111.00	98.00	97.00
Wisconsin.....	562	557	550	544	534	98.00	102.00	102.00	91.00	77.00
North Central, East.....	2,923	2,821	2,720	2,652	2,574	88.48	92.68	93.68	83.26	76.07
Minnesota.....	819	813	807	791	775	79.00	82.00	82.00	71.00	56.00
Iowa.....	1,100	1,073	1,058	1,037	996	75.00	79.00	80.00	68.00	56.00
Missouri.....	638	625	610	592	574	50.00	53.00	51.00	45.00	40.00
North Dakota.....	665	643	616	604	586	54.00	53.00	52.00	44.00	41.00
South Dakota.....	601	641	624	605	581	53.00	57.00	53.00	45.00	30.00
Nebraska.....	788	772	757	719	697	60.00	61.00	61.00	52.00	44.00
Kansas.....	798	758	728	699	685	43.00	49.00	48.00	38.00	37.00
North Central, West.....	5,475	5,325	5,200	5,047	4,894	60.66	63.74	63.45	53.77	45.55
North Central.....	8,398	8,146	7,929	7,699	7,468	70.34	73.76	73.85	63.93	56.07
Delaware.....	20	19	18	17	17	79.00	90.00	93.00	82.00	64.00
Maryland.....	100	97	95	93	91	80.00	92.00	97.00	83.00	68.00
Virginia.....	221	212	205	195	187	70.00	78.00	85.00	68.00	66.00
West Virginia.....	127	122	116	112	106	84.00	89.00	91.00	79.00	70.00
North Carolina.....	106	98	89	83	77	87.00	86.00	85.00	76.00	65.00
South Carolina.....	42	36	31	28	26	81.00	82.00	83.00	69.00	54.00
Georgia.....	41	39	36	35	35	78.00	78.00	77.00	63.00	52.00
Florida.....	25	23	21	20	19	83.00	87.00	87.00	77.00	67.00
South Atlantic.....	682	646	613	584	558	79.03	84.29	87.07	74.23	65.67
Kentucky.....	280	258	248	231	222	53.00	56.00	60.00	51.00	47.00
Tennessee.....	201	193	182	169	157	60.00	60.00	65.00	56.00	49.00
Alabama.....	76	71	60	62	58	66.00	66.00	65.00	51.00	46.00
Mississippi.....	115	110	104	98	92	61.00	53.00	58.00	45.00	43.00
Arkansas.....	156	148	141	133	132	43.00	41.00	43.00	32.00	31.00
Louisiana.....	121	119	118	112	106	52.00	53.00	52.00	46.00	38.00
Oklahoma.....	548	527	507	482	453	38.00	39.00	39.00	33.00	30.00
Texas.....	800	820	780	741	704	45.00	47.00	46.00	35.00	30.00
South Central.....	2,357	2,240	2,140	2,028	1,924	47.29	48.34	48.61	39.41	35.17
Montana.....	525	498	462	430	400	31.00	31.00	30.00	27.00	23.00
Idaho.....	216	211	206	198	190	51.00	54.00	51.00	41.00	36.00
Wyoming.....	186	181	176	171	166	31.00	32.00	34.00	34.00	26.00
Colorado.....	343	343	338	331	324	43.00	47.00	44.00	41.00	31.00
New Mexico.....	161	151	142	135	128	31.00	35.00	33.00	28.00	23.00
Arizona.....	102	90	80	77	74	49.00	51.00	51.00	43.00	41.00
Utah.....	102	97	92	90	87	61.00	63.00	62.00	54.00	38.00
Nevada.....	43	41	40	39	38	60.00	58.00	54.00	49.00	46.00
Washington.....	209	190	184	171	161	65.00	68.00	63.00	55.00	49.00
Oregon.....	194	188	178	169	162	65.00	65.00	61.00	53.00	44.00
California.....	263	245	227	207	190	74.00	78.00	78.00	69.00	59.00
Western.....	2,344	2,239	2,125	2,018	1,920	47.89	49.86	48.07	42.50	35.02
United States.....	14,768	14,203	13,684	13,165	12,079	66.68	69.63	69.80	60.43	53.37

Bureau of Agriculture Economics. Estimates of the crop-reporting board.

<sup>1</sup> Sum of total value of subgroups (classified by age), divided by total number and rounded to nearest dollar for States. Division and United States averages not rounded.<sup>2</sup> Revised, January, 1932. For revisions of numbers, by States, for years earlier than 1928, see February, 1932, issue of Crops and Markets.<sup>3</sup> Preliminary.

TABLE 382.—Horses: Number in countries having 80,000 and over, average 1921–1925, annual 1926–1931

Country	Month of estimate	Average 1921– 1925 <sup>1</sup>	1926	1927	1928	1929	1930	1931
North America, Central America, and West Indies:		Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands
United States—								
On farms.....	Jan. 1.....	18,051	16,067	15,368	14,768	14,208	13,684	13,165
Not on farms.....		<sup>2</sup> 1,708						
Canada.....	June.....	3,627	3,398	3,422	3,376	3,376	3,295	
Mexico.....		<sup>3</sup> 980	1,036					
Guatemala.....	July.....	70	94	75	53	59	63	
Costa Rica.....		105	127	126	102	85		
Cuba.....	December <sup>4</sup> .....	844	685	747	716	634	758	634
Dominican Republic.....		136						
Haiti.....	April.....		110	115	125	125		
Estimated total <sup>5</sup> .....		25,800						
South America:								
Colombia.....		971	980	978		929		
Venezuela.....		168						
Ecuador.....		85				85		
Peru.....		156				<sup>6</sup> 432		
Bolivia.....	December <sup>4</sup> .....	(150)	204	320		376		
Chile.....		452					<sup>7</sup> 441	
Brazil.....	September.....	<sup>8</sup> 5,254						
Uruguay.....		<sup>9</sup> 613					<sup>10</sup> 500	
Paraguay.....	December <sup>4</sup> .....	<sup>11</sup> 490						
Argentina.....	June and December <sup>4</sup> .....	9,432					<sup>12</sup> 9,888	
Estimated total <sup>13</sup> .....		17,800						
Europe:								
England and Wales.....	June.....	1,280	1,129	1,077	1,038	999	961	938
Scotland.....	do.....	202	179	172	166	161	157	153
North Ireland <sup>14</sup> .....	do.....	89	91	86	87	86	87	86
Irish Free State <sup>15</sup> .....	do.....	332	327	319	321	319	325	326
Norway <sup>16</sup> .....	do.....	188	188	183	182	177	177	177
Sweden.....	do.....	<sup>17</sup> 964	648	620			653	
Denmark.....	July.....	564	548	525	519	521	594	498
Netherlands.....	May-June.....	<sup>18</sup> 964					<sup>19</sup> 296	
Belgium.....	December <sup>4</sup> .....	230	250	256	255	253	246	
France.....	do.....	2,765	2,880	2,894	2,927	2,936	2,986	2,924
Spain.....	do.....	634	698	719		<sup>20</sup> 598		
Portugal.....	October-March.....	80						
Italy.....	March.....	1,068		1,050			<sup>21</sup> 987	
Switzerland.....	April.....	134	140				140	
Germany.....	December <sup>4</sup> .....	3,680	3,917	3,873	3,810	3,718	3,617	
Austria.....	do.....	268					<sup>22</sup> 248	
Czechoslovakia.....	do.....	591	<sup>23</sup> 740				<sup>24</sup> 747	
Hungary.....	Spring or summer.....	814	885	903	918	892	860	865
Yugoslavia.....	January.....	1,067	1,117	1,120	1,100	1,140		1,161
Greece.....	December <sup>4</sup> .....	208	270	281	277	290	323	
Bulgaria.....	do.....	<sup>25</sup> 342						
Rumania.....	do.....	1,729	1,815	1,778	1,831	1,850	1,867	1,800
Poland.....	November.....	3,290		4,009		4,017	4,103	4,123
Lithuania.....	Spring.....	470	535	617	611	588	559	
Latvia.....	do.....	324	365	369	365	350	359	360
Estonia.....	Spring or summer.....	210	228	230	228	205	204	
Finland.....	September.....	399	400	398	394	395		
Russia, European and Asiatic.....	Spring.....	24,611	28,428	31,538	33,506	34,606	31,158	
Estimated total <sup>26</sup> .....		22,100						
Africa:								
Morocco.....		174	196	194	187	197	206	
Algeria.....	March.....	161	167	162	164	163	173	
Tunis.....	December <sup>4</sup> .....	73	72	87	82	88	89	95
French West Africa and French Sudan.....		148	190	207	205	236	240	
Nigeria, including British Cameroons.....		173	182	182	203	197	184	
Union of South Africa.....	Spring or summer.....	925	888					
Basutoland.....		166	244	250	250	205	137	
Estimated total <sup>27</sup> .....		2,000						

See footnotes at end of table.

TABLE 382.—*Horses: Number in countries having 80,000 and over, average 1921-1925, annual 1926-1931—Continued*

Country	Month of estimate	Average 1921- 1925 <sup>1</sup>	1926	1927	1928	1929	1930	1931
		Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands
Asia:								
Turkey, European and Asiatic	Summer	452	537	459	485	497	501	
Persia		10 <sup>11</sup> 1,500						
India—								
British	December-April	1,747	1,684	1,091	1,726	1,728	<sup>2</sup> 1,701	
Native States	do.	502	445	406	464	491	<sup>2</sup> 557	
China, including Manchuria and Turkestan	do.	4,900				10 <sup>4</sup> 500		
Japan	December <sup>4</sup>	1,545	1,553	1,496	1,495	1,494	1,490	
French Indo-China		107	97	98	97	97	97	
Siam	Mar. 31	183	247	265	283	298		
Philippine Islands <sup>11</sup>	December <sup>4</sup>	281	294	309	318	332		
Dutch East Indies—								
Java and Madura	do. <sup>4</sup>	273	267	259	258	248	252	249
Outer possessions	do. <sup>4</sup>	443	463	452	451	458	456	432
Estimated total <sup>5</sup>		12,100						
Oceania:								
Australia	December <sup>4</sup>	2,373	2,250	2,123	2,041	1,943	1,846	
New Zealand	Jan. 31	838	815	804	807	299	297	
Estimated total <sup>5</sup>		2,700						
Total, all countries reported, all periods, including Russia—								
To 1930 (35) <sup>12</sup>		68,972	70,940	73,130	74,380	74,570	70,509	
To 1931 (16) <sup>12 13</sup>		27,980	25,956	25,222	24,639	23,928	23,612	22,717
Estimated world total <sup>5</sup>		107,100						

Bureau of Agricultural Economics. Compiled from official sources and the International Institute of Agriculture. Figures in parenthesis are interpolated.

<sup>1</sup> Average for 5-year period if available, otherwise for any year or years within this period except as otherwise stated.

<sup>2</sup> Census.

<sup>3</sup> 1920.

<sup>4</sup> Estimates for countries reporting as of December have been considered as of Jan. 1 of the following year; i. e., horses as reported in France for Dec. 31, 1926, have been placed in the 1927 column.

<sup>5</sup> Includes interpolations for a few countries not reporting each year and rough estimates for some others.

<sup>6</sup> 1924.

<sup>7</sup> 1918.

<sup>8</sup> Incomplete. Refers to horses used in agriculture only for Northern Ireland and Irish Free State.

<sup>9</sup> Rural communities only.

<sup>10</sup> Unofficial.

<sup>11</sup> Includes mules and asses.

<sup>12</sup> Comparable totals for the number of countries indicated.

<sup>13</sup> Excluding Russia.

TABLE 383.—*Mules and mule colts: Estimated number on farms and value per head, by States, January 1, 1928-1932*

State and division	Number					Value per head <sup>1</sup>				
	1928 <sup>2</sup>	1929 <sup>2</sup>	1930 <sup>2</sup>	1931 <sup>2</sup>	1932 <sup>2</sup>	1928	1929	1930	1931	1932
	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Dol- lars	Dol- lars	Dol- lars	Dol- lars	Dol- lars
Maine.....										
New Hampshire.....										
Vermont.....										
Massachusetts.....										
Rhode Island.....										
Connecticut.....										
New York.....	7	6	6	6	6	125.00	120.00	127.00	127.00	102.00
New Jersey.....	4	4	4	3	3	118.00	123.00	130.00	130.00	110.00
Pennsylvania.....	51	51	51	50	50	121.00	127.00	129.00	117.00	111.00
North Atlantic.....	62	61	61	59	59	121.26	126.05	128.08	118.80	110.61
Ohio.....	33	32	32	32	32	102.00	101.00	107.00	94.00	89.00
Indiana.....	97	90	86	80	83	86.00	88.00	89.00	83.00	77.00
Illinois.....	150	142	136	132	129	82.00	80.00	88.00	79.00	69.00
Michigan.....	7	6	6	6	6	93.00	102.00	110.00	93.00	89.00
Wisconsin.....	7	7	7	7	7	95.00	95.00	92.00	79.00	74.00
North Central, East.....	294	277	267	263	257	86.14	88.96	91.43	82.31	74.78
Minnesota.....	15	15	15	15	15	83.00	83.00	85.00	74.00	63.00
Iowa.....	95	90	85	83	81	84.00	86.00	90.00	76.00	64.00
Missouri.....	330	313	300	297	291	68.00	75.00	76.00	64.00	55.00
North Dakota.....	9	8	8	8	8	57.00	55.00	59.00	49.00	45.00
South Dakota.....	19	19	19	18	18	63.00	63.00	64.00	56.00	46.00
Nebraska.....	112	106	99	95	91	75.00	76.00	79.00	62.00	57.00
Kansas.....	203	185	160	155	143	60.00	65.00	66.00	58.00	52.00
North Central, West.....	733	736	686	671	647	68.91	73.61	75.68	63.54	55.47
North Central.....	1,077	1,013	953	934	904	73.61	77.81	80.09	68.83	60.96
Delaware.....	10	10	10	10	10	95.00	96.00	104.00	100.00	93.00
Maryland.....	29	29	29	29	29	113.00	111.00	118.00	105.00	95.00
Virginia.....	98	97	96	94	93	92.00	97.00	101.00	85.00	84.00
West Virginia.....	14	14	13	13	12	81.00	86.00	95.00	88.00	74.00
North Carolina.....	284	282	282	276	273	119.00	124.00	120.00	114.00	89.00
South Carolina.....	187	183	180	176	176	105.00	105.00	109.00	92.00	74.00
Georgia.....	347	344	344	340	333	105.00	109.00	105.00	87.00	70.00
Florida.....	43	42	42	42	42	119.00	124.00	125.00	106.00	97.00
South Atlantic.....	1,012	1,001	996	980	968	109.06	111.57	110.58	96.69	79.62
Kentucky.....	284	270	257	248	241	67.00	69.00	77.00	61.00	59.00
Tennessee.....	342	335	328	321	318	75.00	80.00	80.00	73.00	67.00
Alabama.....	313	319	322	322	319	95.00	95.00	93.00	74.00	62.00
Mississippi.....	345	351	358	358	347	87.00	85.00	88.00	66.00	63.00
Arkansas.....	338	345	353	342	332	64.00	65.00	67.00	48.00	46.00
Louisiana.....	187	191	197	197	189	85.00	89.00	85.00	74.00	63.00
Oklahoma.....	340	330	318	302	287	62.00	68.00	60.00	47.00	43.00
Texas.....	1,160	1,100	1,053	990	960	71.00	71.00	71.00	54.00	47.00
South Central.....	3,309	3,244	3,186	3,078	2,993	73.13	74.73	76.50	60.20	54.05
Montana.....	10	9	9	9	8	47.00	47.00	44.00	44.00	29.00
Idaho.....	7	7	7	7	7	55.00	60.00	63.00	51.00	45.00
Wyoming.....	4	4	4	4	4	55.00	55.00	59.00	48.00	45.00
Colorado.....	32	31	30	28	27	56.00	58.00	57.00	52.00	42.00
New Mexico.....	27	25	24	23	22	45.00	50.00	49.00	39.00	39.00
Arizona.....	18	12	12	12	12	77.00	82.00	77.00	66.00	58.00
Utah.....	3	3	3	3	3	61.00	67.00	65.00	54.00	35.00
Nevada.....	3	3	3	3	3	61.00	62.00	55.00	47.00	44.00
Washington.....	24	23	22	21	20	73.00	74.00	68.00	55.00	44.00
Oregon.....	16	15	14	14	14	72.00	71.00	64.00	51.00	49.00
California.....	48	45	42	40	38	85.00	88.00	90.00	78.00	67.00
Western.....	187	177	170	164	158	66.49	68.98	67.11	57.21	50.39
United States.....	5,647	5,496	5,366	5,215	5,082	79.79	82.39	83.76	69.17	60.69

Bureau of Agricultural Economics. Estimates of crop-reporting board. Revisions by States, 1920-1927, are published in February, 1932, Crops and Markets.

<sup>1</sup> Sum of total value of subgroups (classified by age), divided by total number and rounded to nearest dollar for States, Division and the United States averages not rounded.

<sup>2</sup> Revised, January, 1932.

<sup>3</sup> Preliminary.

**BEEF CATTLE, HOGS, SHEEP, HORSES, MULES, ETC. 823**

**TABLE 384.—Mules: Number in countries having 20,000 and over, average 1921–1925, annual 1926–1931**

Country	Month of estimate	Average 1921–1925 <sup>1</sup>	1926	1927	1928	1929	1930	1931
<b>North America, Central America, and West Indies:</b>								
United States—		Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands
On farms.....	January.....	5,804	5,003	5,801	5,647	5,496	5,365	5,215
Not on farms.....		<sup>2</sup> 373						
Mexico.....		390	688					
Cuba.....	December <sup>4</sup> .....	74	72	73	68	92	90	
Dominican Republic.....	April.....	44						
Porto Rico.....		20						
Haiti.....			23	23	23	25		
Estimated total <sup>5</sup> .....		6,800						
<b>South America:</b>								
Colombia.....		351	360	346		329		
Venezuela.....		55						
Peru.....		(130)				<sup>3</sup> 130		
Bolivia.....	December <sup>4</sup> .....	(150)	155	175				
Chile.....		42					<sup>3</sup> 31	
Argentina.....	December <sup>4</sup> .....	623						
Estimated total <sup>5</sup> .....		1,300						
<b>Europe:</b>								
Total Ireland.....		25	21	19	19	17	17	17
Irish Free State.....						17	10	16
France.....	December <sup>4</sup> .....	183	188	185	183	166	143	154
Spain.....	December–May <sup>4</sup> .....	1,129	1,286	1,205		<sup>3</sup> 1,154		
Portugal.....	October.....	88						
Italy.....	March.....	500	520				<sup>3</sup> 457	
Germany.....	December <sup>4</sup> .....	( <sup>6</sup> )	( <sup>6</sup> )			( <sup>6</sup> )		
Yugoslavia.....	January.....	28	15	15	15	15	15	16
Greece.....	December <sup>4</sup> .....	128	138	148	135	150	148	
Bulgaria.....	do. <sup>4</sup> .....	26						
Estimated total <sup>5</sup> .....		2,200						
<b>Africa:</b>								
Morocco.....		64	78	84	88	92	100	
Algeria.....	March.....	213	165	164	164	105	169	
Tunis.....	December <sup>4</sup> .....	31	33	37	38	40	41	44
Egypt.....	September.....	21	23	21	23	22	21	
Union of South Africa.....	April–August.....	131	138					
Estimated total <sup>5</sup> .....		500						
<b>Asia and Oceania:</b>								
Turkey, European and Asiatic.....		91	23	30	37		23	
Syria and Lebanon.....		20	25	20	20	22	23	
India, British.....	December–April.....	75	69	70	71	71	<sup>3</sup> 75	
China.....		<sup>7</sup> 5,100						
Kwantung.....	December <sup>4</sup> .....	16	17	19	20	22	22	23
Estimated total <sup>5</sup> .....		5,400						
Total all countries reported all periods to 1930 (14) <sup>8</sup> .....		6,747	6,747	6,655	6,494	6,240	6,232	
Estimated world total <sup>5</sup> .....		16,200						

Bureau of Agricultural Economics. Compiled from official sources and the International Institute of Agriculture. Figures in parentheses are interpolated.

<sup>1</sup> Average for 5-year period if available. Otherwise for any year or years within this period except as otherwise stated.

<sup>2</sup> Census.

<sup>3</sup> 1920.

<sup>4</sup> Estimates for countries reporting as of December have been considered as of Jan. 1 of the following year; i. e., mules reporting as of Dec. 31, 1926, in France have been placed in 1927 column.

<sup>5</sup> Includes interpolations for a few countries not reporting each year and rough estimates for some others. It is probable that mules are found in many other countries for which no estimates at all are available and for which no estimates are included in these totals.

<sup>6</sup> Included with asses.

<sup>7</sup> Estimate based on figures for 20 Provinces which supported 84 per cent of total in China in 1914.

<sup>8</sup> Comparable totals for the number of countries indicated.

TABLE 385.—*Asses: Number in countries having 20,000 and over, average 1921–1925, annual 1926–1931*

Country	Month of estimate	Average, 1921–1925 <sup>1</sup>	1926	1927	1928	1929	1930	1931
		Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands
<b>North America, Central America, and West Indies:</b>								
United States, on farms		<sup>2</sup> 72						
Mexico		<sup>3</sup> 521	850					
Guatemala <sup>4</sup>		(30)			27	34	37	
Dominican Republic	April	122						
Haiti		(150)	170	210	240	240		
Estimated total <sup>5</sup>		1,000						
<b>South America:</b>								
Colombia		149	140	157		149		
Venezuela		200						
Peru		(265)				<sup>2</sup> 265		
Bolivia	December <sup>6</sup>	(185)	189	190				
Chile		30					<sup>2</sup> 37	
Brazil	September	<sup>4</sup> 1,865						
Paraguay	December <sup>6</sup>	20						
Argentina	do. <sup>6</sup>	289						
Estimated total <sup>5</sup>		4,400						
<b>Europe:</b>								
Irish Free State		210	199	197	196	185	183	177
Ireland, total	June	224	208	206	204	194	191	191
France	December <sup>6</sup>	290	278	264	260	250	234	191
Spain	December–May <sup>6</sup>	1,067	1,077	1,138		<sup>2</sup> 1,006		
Portugal	October	236						
Italy		969					<sup>2</sup> 852	
Germany	December <sup>6</sup>	<sup>4</sup> 32				<sup>4</sup> 24	<sup>4</sup> 21	<sup>4</sup> 19
Yugoslavia	January	90	96	98	104	106		107
Greece	December <sup>6</sup>	250	299	319	328	343	381	
Bulgaria	do. <sup>6</sup>	122						
Estimated total <sup>5</sup>		3,500						
<b>Africa:</b>								
Morocco		490	565	508	497	541	576	
Algeria	March	207	285	275	279	296	301	
Libia (Italian)		40						
Tunis	December <sup>6</sup>	188	119	154	162	159	161	180
French West Africa and French Sudan		334	407	430	462	602	577	
Nigeria and British Cameroons		499	496	500	538	548	278	
Egypt	September	653	739	750	762	759	763	
Kenya colony		34	36	36	36	37		
Anglo-Egyptian Sudan		296	345	348	349	350	351	
Eritrea (Italian)		47						
French Equatorial Africa		47	57					
British Southwest Africa		36	45	52	58	61	61	
Union of South Africa	April–August	780	796					
Rhodesia, South <sup>4</sup>	December <sup>6</sup>	25	33	38	42	45	50	
Tanganyika Territory		24	36	40	43	50	51	
Estimated total <sup>5</sup>		3,700						
<b>Asia:</b>								
Cyprus		45	43	42	52	54	54	
Turkey, European and Asiatic		556	949	930	928	849	861	
Syria and Lebanon		91	100	125	123	125	115	
India, British	December–April	1,382	1,408	1,409	1,443	1,442	<sup>2</sup> 1,380	
Native States	do	348	307	306	308	306	<sup>2</sup> 441	
Kwantung	December <sup>6</sup>	29	28	27	27	28	29	27
Estimated total <sup>5</sup>		2,500						
Total, all countries reported, all periods to 1930 (20). <sup>7</sup>		6,127	6,884	6,920	7,061	7,188	7,038	
Estimated world total <sup>5</sup>		13,800						

Bureau of Agricultural Economics. Compiled from official sources and the International Institute of Agriculture. Figures in parentheses are interpolated.

<sup>1</sup> Average for 5-year period if available. Otherwise, for any year or years within this period except as otherwise stated.

<sup>2</sup> Census.

<sup>3</sup> Incomplete.

<sup>4</sup> Asses and mules.

<sup>7</sup> Comparable totals for number of countries indicated.

# DAIRY AND POULTRY STATISTICS

TABLE 386.—*Milk cows: Numbers and value per head in the United States, 1850, 1860, 1867-1931*

Year	Milk cows on farms		Year	Milk cows on farms	
	Num- ber <sup>1</sup>	Value per head Jan. 1 <sup>2</sup>		Num- ber <sup>1</sup>	Value per head Jan. 1 <sup>2</sup>
	Thou- sands	Dollars		Thou- sands	Dollars
1850 <sup>3</sup>	6,535		1900 <sup>4</sup>	17,156	
1860 <sup>3</sup>	8,588		1900	15,253	30.18
1867	8,349	28.74	1901	16,521	28.65
1868	8,662	26.56	1902	16,787	27.91
1869	9,243	29.15	1903	16,073	28.85
1870 <sup>3</sup>	8,935		1904	16,469	27.90
1870	10,096	32.70	1905	16,842	26.21
1871	10,023	33.89	1906	17,277	28.12
1872	10,304	29.45	1907	17,650	28.60
1873	10,576	26.72	1908	17,937	29.29
1874	10,705	25.63	1909	18,154	30.90
1875	10,907	25.74	1910 <sup>3</sup>	20,625	
1876	11,085	25.61	1910	18,206	33.70
1877	11,261	25.47	1911	18,244	38.17
1878	11,300	25.74	1912	18,312	37.62
1879	11,826	21.71	1913	18,526	42.40
1880 <sup>3</sup>	12,443		1914	18,930	51.51
1880	12,027	23.27	1915	19,526	52.84
1881	12,369	23.95	1916	20,064	51.49
1882	12,012	25.89	1917	20,541	56.95
1883	13,126	30.21	1918	21,021	67.37
1884	13,561	31.37	1919	21,219	74.08
1885	13,905	29.70	1920 <sup>3</sup>	19,675	
1886	14,235	27.40	1920	21,455	81.51
1887	14,522	26.08	1921	21,440	61.20
1888	14,856	24.65	1922	21,822	43.69
1889	15,299	23.94	1923	22,099	43.68
1890 <sup>3</sup>	16,518		1924	22,288	49.94
1890	15,958	22.14	1925 <sup>3</sup>	20,800	
1891	16,020	21.62	1925	22,505	48.38
1892	16,416	21.40	1926	22,311	54.73
1893	16,424	21.75	1927	22,159	59.24
1894	16,487	21.77	1928	22,120	73.47
1895	16,505	21.97	1929	22,330	83.09
1896	16,138	22.55	1930 <sup>3</sup>	20,496	
1897	15,942	23.16	1930	22,910	82.80
1898	15,841	27.45	1931	23,588	57.11
1899	15,900	29.66	1932 <sup>4</sup>	24,379	39.61

Bureau of Agricultural Economics. Estimates of the crop reporting board.

<sup>1</sup> Prior to 1900, estimates for each 10-year period represent an index of annual changes applied to the census as a base on first report after census data were available. Figures for 1900 to 1919 are tentatively revised estimates of the Bureau of Agricultural Economics for numbers on Jan. 1. Figures from 1920 to 1931 are revised estimates made in 1932, based upon study of 1930 census report. Figures 1900 to 1932 relate to "cows and heifers 2 years old and over Jan. 1, kept for milk."

<sup>2</sup> Values for 1867-1899 relate to "milk cows." Data for 1900-1925 are an old series of values of "milk cows" adjusted to relate to "milk cows and heifers, 2 years old and over" on basis of relationship between the 2 series from 1926 to 1928. Conversion factor was 0.955 (base is old series). Data for 1926-1932 are values relating to "milk cows and heifers 2 years old and over."

<sup>3</sup> Italic figures are from the census. Figures for census years 1850-1890 represent "milk cows"; 1900, "cows kept for milk 2 years and over"; 1910 "cows and heifers kept for milk, born before Jan. 1, 1909" (15½ months and over); 1920 "dairy cattle 2 years old and over kept mainly for milk production"; 1925 and 1930, "number of cows milked in 1924 and 1929." Census dates were June 1 from 1850 to 1900; Apr. 15, 1910; Jan. 1, 1920 and 1925; Apr. 1, 1930.

<sup>4</sup> Preliminary.

TABLE 387.—*Milk cows and heifers: Estimated number on farms and value per head, by States, January 1, 1928-1932*

State and division	Cows and heifers, 2 years old and over, kept for milk									
	Number					Value per head				
	1928	1929	1930	1931	1932 <sup>1</sup>	1928	1929	1930	1931	1932 <sup>1</sup>
	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Dol- lars	Dol- lars	Dol- lars	Dol- lars	Dol- lars
Maine.....	138	135	136	140	143	76.00	87.00	96.00	70.00	50.00
New Hampshire.....	75	74	75	79	81	100.00	113.00	118.00	90.00	61.00
Vermont.....	279	276	277	288	299	97.00	100.00	101.00	79.00	52.00
Massachusetts.....	136	132	132	131	131	125.00	130.00	140.00	122.00	88.00
Rhode Island.....	20	20	21	21	21	132.00	142.00	150.00	123.00	90.00
Connecticut.....	101	101	103	108	113	130.00	140.00	141.00	110.00	83.00
New York.....	1,306	1,306	1,330	1,370	1,411	111.00	124.00	120.00	86.00	61.00
New Jersey.....	117	117	118	119	120	120.00	135.00	155.00	125.00	89.00
Pennsylvania.....	820	810	835	860	886	97.00	111.00	112.00	80.00	60.00
North Atlantic.....	2,992	2,971	3,027	3,116	3,205	105.74	117.64	118.09	87.16	62.51
Ohio.....	875	867	900	910	938	83.00	93.00	93.00	59.00	44.00
Indiana.....	686	693	702	722	751	75.00	85.00	84.00	53.00	39.00
Illinois.....	967	977	1,026	1,057	1,099	76.00	89.00	89.00	64.00	42.00
Michigan.....	775	785	800	825	850	87.00	90.00	99.00	62.00	45.00
Wisconsin.....	1,940	1,925	2,015	2,096	2,150	86.00	97.00	97.00	64.00	43.00
North Central, East.....	5,263	5,247	5,443	5,610	5,788	82.34	93.56	93.45	61.48	42.75
Minnesota.....	1,525	1,539	1,595	1,643	1,708	72.00	85.00	82.00	56.00	35.00
Iowa.....	1,368	1,394	1,400	1,414	1,456	76.00	86.00	85.00	59.00	38.00
Missouri.....	826	877	930	989	1,030	61.00	74.00	70.00	44.00	30.00
North Dakota.....	504	516	540	567	589	61.00	75.00	73.00	50.00	33.00
South Dakota.....	557	590	577	589	607	68.00	77.00	78.00	52.00	31.00
Nebraska.....	676	676	680	680	700	71.00	84.00	79.00	56.00	36.00
Kansas.....	760	760	780	811	860	62.00	75.00	74.00	48.00	33.00
North Central, West.....	6,216	6,312	6,502	6,693	6,950	68.84	80.85	78.55	53.03	34.22
North Central.....	11,479	11,559	11,945	12,303	12,738	75.03	86.62	85.34	56.88	38.10
Delaware.....	34	33	33	33	35	92.00	110.00	112.00	80.00	54.00
Maryland.....	177	178	180	184	186	85.00	97.00	100.00	75.00	40.00
Virginia.....	360	367	375	383	390	58.00	70.00	72.00	43.00	35.00
West Virginia.....	202	204	210	214	225	65.00	75.00	76.00	47.00	37.00
North Carolina.....	264	285	285	299	306	50.00	64.00	64.00	48.00	37.00
South Carolina.....	149	145	140	140	141	47.00	55.00	54.00	46.00	33.00
Georgia.....	322	315	320	329	336	42.00	49.00	49.00	39.00	25.00
Florida.....	85	85	86	86	88	37.00	46.00	55.00	47.00	38.00
South Atlantic.....	1,623	1,612	1,629	1,668	1,707	57.43	66.65	68.06	47.76	35.56
Kentucky.....	496	512	498	498	518	60.00	65.00	64.00	40.00	30.00
Tennessee.....	450	461	468	487	507	53.00	60.00	60.00	39.00	28.00
Alabama.....	318	353	300	371	390	40.00	46.00	48.00	33.00	23.00
Mississippi.....	405	415	430	447	469	40.00	45.00	47.00	30.00	21.00
Arkansas.....	364	370	372	383	421	42.00	48.00	48.00	27.00	22.00
Louisiana.....	231	238	240	247	260	36.00	49.00	47.00	36.00	30.00
Oklahoma.....	623	631	650	682	716	56.00	64.00	50.00	36.00	27.00
Texas.....	1,105	1,160	1,203	1,238	1,288	57.00	61.00	56.00	36.00	26.00
South Central.....	4,022	4,140	4,220	4,353	4,569	51.02	57.11	55.03	35.13	26.86
Montana.....	183	190	193	193	195	63.00	79.00	77.00	55.00	36.00
Idaho.....	170	173	178	187	194	75.00	86.00	80.00	65.00	39.00
Wyoming.....	70	71	72	72	72	70.00	86.00	84.00	65.00	39.00
Colorado.....	267	268	259	260	266	69.00	77.00	72.00	56.00	36.00
New Mexico.....	67	68	69	69	70	57.00	67.00	65.00	50.00	37.00
Arizona.....	35	37	38	40	42	55.00	65.00	65.00	73.00	57.00
Utah.....	100	104	108	111	113	73.00	87.00	82.00	62.00	36.00
Nevada.....	20	20	21	21	21	65.00	93.00	90.00	70.00	51.00
Washington.....	270	270	280	288	300	60.00	99.00	92.00	68.00	53.00
Oregon.....	216	220	229	240	250	72.00	88.00	80.00	61.00	45.00
California.....	625	637	642	637	637	60.00	94.00	94.00	79.00	51.00
Western.....	2,013	2,048	2,089	2,118	2,160	74.45	83.33	84.76	66.80	44.78
United States.....	22,129	22,330	22,910	23,558	24,379	73.47	83.99	82.80	57.11	39.61

Bureau of Agricultural Economics. Estimates of crop reporting board. Revisions by States, 1920-1927, are published in February, 1932, Crops and Markets.

<sup>1</sup> Preliminary.

TABLE 388.—*Heifers and heifer calves: Estimated number on farms, by States, January 1, 1928-1932*

State and division	Heifers 1 to 2 years old being kept for milk cows					Heifer calves under 1 year being kept for milk cows				
	1928	1929	1930	1931	1932 <sup>1</sup>	1928	1929	1930	1931	1932 <sup>1</sup>
	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands
Maine.....	33	33	36	40	58	54	37	40	41	41
New Hampshire.....	15	16	17	18	18	17	18	18	19	20
Vermont.....	49	55	58	59	58	56	59	60	59	57
Massachusetts.....	17	18	21	20	18	18	21	20	20	20
Rhode Island.....	3	3	3	3	3	3	4	4	4	4
Connecticut.....	15	19	18	19	17	16	18	19	19	18
New York.....	197	224	245	237	213	232	250	242	218	215
New Jersey.....	15	15	15	17	16	16	17	18	16	19
Pennsylvania.....	131	147	174	165	155	162	180	187	100	158
North Atlantic.....	476	527	588	578	536	543	604	608	556	552
Ohio.....	145	170	187	189	182	175	193	194	188	180
Indiana.....	120	135	141	149	140	139	145	154	145	144
Illinois.....	183	195	218	224	215	200	225	240	215	225
Michigan.....	113	131	106	109	160	156	171	175	165	163
Wisconsin.....	304	308	385	402	399	380	397	415	412	400
North Central, East.....	955	1,019	1,097	1,143	1,096	1,050	1,131	1,178	1,125	1,121
Minnesota.....	283	313	330	341	335	345	375	355	340	355
Iowa.....	290	300	310	300	285	309	310	310	295	285
Missouri.....	160	176	200	209	198	182	206	210	205	200
North Dakota.....	89	100	123	120	115	103	127	125	122	120
South Dakota.....	120	127	135	138	138	131	139	150	154	154
Nebraska.....	138	138	138	131	120	142	142	140	130	127
Kansas.....	130	137	155	143	130	141	160	165	155	165
North Central, West.....	1,216	1,291	1,400	1,382	1,347	1,353	1,468	1,461	1,401	1,403
North Central.....	2,171	2,310	2,497	2,525	2,443	2,403	2,599	2,639	2,528	2,527
Delaware.....	5	5	6	6	5	5	6	6	5	4
Maryland.....	27	29	30	32	28	29	30	31	28	26
Virginia.....	44	40	51	56	54	58	62	68	56	53
West Virginia.....	28	29	32	31	29	30	34	34	34	34
North Carolina.....	50	57	58	64	68	59	62	68	70	70
South Carolina.....	29	27	28	30	29	28	29	30	29	30
Georgia.....	71	69	73	80	83	71	75	84	82	84
Florida.....	16	15	14	14	15	16	15	14	15	16
South Atlantic.....	268	280	292	313	309	296	313	333	319	317
Kentucky.....	78	80	84	79	71	82	86	81	77	75
Tennessee.....	95	98	100	98	93	101	103	102	98	95
Alabama.....	92	94	98	100	104	97	100	105	108	114
Mississippi.....	66	70	78	81	84	68	75	83	85	87
Arkansas.....	88	88	84	92	97	92	87	96	106	105
Louisiana.....	46	51	49	51	54	53	51	53	56	58
Oklahoma.....	127	128	132	138	145	102	164	165	174	182
Texas.....	202	200	230	228	235	214	228	250	250	205
South Central.....	792	818	845	867	883	899	894	935	903	881
Montana.....	35	37	37	39	39	39	40	40	41	41
Idaho.....	38	39	43	50	53	40	41	50	53	51
Wyoming.....	15	15	15	15	15	18	16	16	16	17
Colorado.....	56	57	57	57	59	65	66	66	68	70
New Mexico.....	13	14	15	15	15	16	16	17	17	17
Arizona.....	9	9	9	10	11	10	10	10	11	12
Utah.....	24	26	25	28	29	27	26	28	29	30
Nevada.....	8	7	6	6	6	8	7	7	7	7
Washington.....	57	61	62	65	65	64	65	65	70	70
Oregon.....	47	49	52	55	57	50	54	53	58	58
California.....	150	155	157	154	145	100	160	140	145	135
Western.....	452	469	478	494	494	495	501	490	518	514
United States.....	4,158	4,404	4,700	4,777	4,665	4,606	4,911	5,005	4,882	4,591

Bureau of Agricultural Economics. Estimates of crop-reporting board. Revisions by States, 1920-1927, are published in February, 1932, Crops and Markets

<sup>1</sup> Preliminary.

TABLE 389.—*Heifers and heifer calves: Estimated number on farms, United States, January 1, 1920-1932*

Year	Heifers 1 to 2 years old being kept for milk cows	Heifer calves under 1 year being kept for milk cows	Year	Heifers 1 to 2 years old being kept for milk cows	Heifer calves under 1 year being kept for milk cows
	Thousands	Thousands		Thousands	Thousands
1920.....	4,420	4,420	1927.....	4,048	4,383
1921.....	4,164	4,164	1928.....	4,158	4,606
1922.....	3,972	3,972	1929.....	4,404	4,911
1923.....	4,155	4,155	1930.....	4,700	5,005
1924.....	4,143	4,426	1931.....	4,777	4,882
1925.....	4,171	4,274	1932 <sup>1</sup> .....	4,665	4,891
1926.....	4,045	4,276			

Bureau of Agricultural Economics.

<sup>1</sup> Preliminary.TABLE 390.—*Purebred dairy cattle: Number registered, each year, by breeds, United States, 1921-1931*

Year	Ayrshire			Guernsey			Holstein-Friesian			Jersey		
	Bulls	Cows	Total	Bulls	Cows	Total	Bulls	Cows	Total	Bulls	Cows	Total
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
1921.....	1,565	4,816	5,874	8,036	13,971	22,007	39,585	88,265	127,850	11,213	21,123	42,336
1922.....	1,578	5,975	7,553	8,085	14,007	22,072	30,631	83,141	113,772	11,651	33,801	45,452
1923.....	1,431	5,508	6,939	8,036	16,976	25,734	29,089	80,043	115,132	12,261	38,159	50,450
1924.....	1,581	5,972	7,553	11,299	18,166	28,467	28,209	83,320	111,539	12,331	39,332	52,163
1925.....	1,720	6,142	7,862	12,392	20,742	32,041	26,935	82,659	109,594	12,131	41,725	53,856
1926.....	1,847	6,554	8,401	12,777	22,694	35,471	28,817	81,146	109,983	15,606	48,915	64,521
1927.....	2,274	7,837	10,111	14,363	24,664	39,027	33,512	88,214	121,726	19,393	54,516	73,909
1928.....	2,586	8,833	11,419	16,661	26,288	40,949	35,438	89,927	125,365	19,230	52,431	71,661
1929.....	2,050	8,159	10,209	15,810	28,662	44,472	29,242	75,901	105,143	14,350	43,787	58,137
1930.....	1,552	7,324	8,876	12,880	27,964	40,844	21,811	70,535	92,346	10,262	38,211	48,473
1931.....												

Bureau of Agricultural Economics. Obtained from registry associations. See 1930 Yearbook, Table 441, p. 901, for data for earlier years.

TABLE 391.—*Cattle: Tuberculin testing under accredited-herd and area plans, 1920-21 to 1930-31*

Year beginning July—	Cattle tested					Modified accredited counties	Herds accredited <sup>1</sup>	Herds passed <sup>1</sup> test <sup>1</sup>	Herds under supervision <sup>1</sup>
	Accred-ited-herd plan	Area plan	Total	Reactors found	Per-centage of reactors				
	Number	Number	Number	Number	Per cent	Number	Number	Number	Number
1920-21.....	1,366,358		1,366,358	53,768	3.9	4,831	33,215	71,806	
1921-22.....	1,722,209	1,662,027	2,384,236	82,569	3.5	8,015	111,719	140,376	
1922-23.....	1,695,662	1,765,187	3,460,849	113,844	3.3	12,310	150,748	187,915	
1923-24.....	1,865,863	3,446,501	5,312,364	171,559	3.2	28	19,747	216,737	306,809
1924-25.....	2,008,526	4,991,502	7,000,028	214,491	3.1	51	24,110	392,740	414,620
1925-26.....	1,989,048	6,661,732	8,650,780	323,084	3.7	109	24,009	382,674	435,840
1926-27.....	2,522,791	7,177,385	9,700,176	285,361	2.9	149	34,084	229,086	291,148
1927-28.....	2,589,844	8,691,646	11,281,490	262,113	2.3	180	38,880	427,695	473,218
1928-29.....	2,853,533	8,830,087	11,683,620	206,764	1.8	213	1,639	249,420	281,323
1929-30.....	2,953,350	9,892,521	12,845,871	216,932	1.7	236	11,863	227,921	347,448
1930-31.....	3,086,403	10,695,870	13,782,273	203,778	1.5	247	26,259	350,735	356,916

Bureau of Animal Industry.

<sup>1</sup> The figures in these columns represent net increases at the close of each year.<sup>2</sup> Testing during 6 months.<sup>3</sup> Represents net decrease during the year.

TABLE 392.—*Milk: Annual production of milk per milk cow in herds kept by crop correspondents, by States, 1926-1931*<sup>1</sup>

State and division	1925	1926	1927	1928	1929	1930	1931
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Maine.....	5,274	5,288	5,262	5,069	5,232	5,361	5,055
New Hampshire.....	5,232	5,861	5,718	5,704	5,761	5,673	5,472
Vermont.....	5,223	5,180	5,350	5,200	5,171	5,259	5,283
Massachusetts.....	6,190	6,713	6,701	6,536	6,261	6,603	6,348
Rhode Island.....	6,248	6,622	6,734	7,006	6,807	7,166	6,975
Connecticut.....	5,934	6,391	6,549	6,240	6,178	6,369	6,226
New York.....	5,943	6,159	6,296	6,323	6,220	6,193	6,305
New Jersey.....	6,655	6,490	6,768	7,085	7,163	6,962	7,136
Pennsylvania.....	5,834	6,135	6,260	6,268	6,287	6,231	6,238
North Atlantic.....	5,840	6,061	6,185	6,176	6,133	6,138	6,150
Ohio.....	5,469	5,670	5,883	5,856	5,907	5,767	5,834
Indiana.....	5,083	5,207	5,423	5,356	5,542	5,311	5,381
Illinois.....	4,937	5,143	5,070	5,252	5,320	5,344	5,207
Michigan.....	6,035	6,342	6,363	6,442	6,464	6,299	6,342
Wisconsin.....	5,928	6,108	6,172	6,262	6,381	6,196	6,077
North Central, East.....	5,578	5,783	5,861	5,933	6,025	5,882	5,829
Minnesota.....	5,524	5,539	5,673	5,835	5,977	5,898	5,770
Iowa.....	4,438	4,681	4,778	5,124	5,280	5,283	5,105
Missouri.....	3,398	3,589	3,720	3,852	3,854	3,817	3,784
North Dakota.....	4,310	4,474	4,544	4,904	4,885	4,897	4,882
South Dakota.....	3,918	4,070	4,468	4,606	4,754	4,758	4,730
Nebraska.....	4,225	4,693	4,855	4,907	4,870	5,119	5,168
Kansas.....	4,292	4,721	4,870	4,938	5,034	5,016	5,070
North Central, West.....	4,481	4,690	4,835	5,030	5,115	5,110	5,046
North Central.....	5,010	5,218	5,331	5,465	5,554	5,485	5,408
Delaware.....	4,788	5,019	5,289	5,078	5,213	4,940	5,186
Maryland.....	5,244	5,505	5,797	5,792	5,591	5,302	5,420
Virginia.....	4,109	4,337	4,739	4,612	4,541	4,015	4,228
West Virginia.....	3,863	4,298	4,651	4,673	4,462	4,252	4,337
North Carolina.....	4,048	4,420	4,520	4,444	4,389	4,188	4,191
South Carolina.....	3,245	3,501	3,705	3,773	3,595	3,635	3,702
Georgia.....	3,169	3,340	3,659	3,508	3,419	3,331	3,203
Florida.....	2,628	2,509	2,458	2,541	2,698	2,497	2,601
South Atlantic.....	3,881	4,142	4,415	4,345	4,253	4,007	4,063
Kentucky.....	4,413	4,654	4,782	4,541	4,480	4,204	4,149
Tennessee.....	3,446	4,015	4,108	4,124	4,048	3,851	3,732
Alabama.....	2,817	3,005	3,075	2,986	3,069	3,045	2,896
Mississippi.....	2,558	2,835	2,987	3,026	3,011	2,996	2,935
Arkansas.....	3,154	3,410	3,626	3,483	3,474	3,239	3,242
Louisiana.....	2,324	2,403	2,582	2,480	2,652	2,509	2,470
Oklahoma.....	3,705	4,170	4,267	4,130	4,167	3,939	3,951
Texas.....	2,798	3,303	3,626	3,553	3,604	3,440	3,443
South Central.....	3,221	3,598	3,777	3,680	3,703	3,529	3,478
Montana.....	4,009	4,386	4,657	4,737	5,150	5,183	4,687
Idaho.....	5,661	5,776	5,953	6,149	6,300	6,713	6,394
Wyoming.....	3,872	4,380	4,508	4,657	4,991	4,696	4,602
Colorado.....	4,371	4,648	5,101	5,039	5,286	5,223	4,981
New Mexico.....	3,075	3,556	4,188	3,822	3,674	3,677	4,027
Arizona.....	5,143	5,898	6,069	5,697	5,819	5,928	5,627
Utah.....	5,107	5,451	5,466	5,792	6,050	5,867	5,761
Nevada.....	4,781	4,879	4,924	4,923	5,551	5,521	5,108
Washington.....	6,083	6,275	6,670	6,512	6,506	6,585	6,400
Oregon.....	5,356	5,928	5,937	6,100	5,950	6,019	5,877
California.....	6,108	5,636	5,919	6,088	6,369	6,479	6,591
Western.....	5,317	5,404	5,706	5,748	5,936	6,002	5,873
United States.....	4,785	5,015	5,164	5,214	5,285	5,188	5,114

Bureau of Agricultural Economics.

<sup>1</sup> State averages are calculated by multiplying average daily production per cow by the number of days in the year. Daily production derived from milk production and milk cows reported on the 1st of each month for about 20,000 herds. Averages for United States and divisions are weighted by States. Weights are not yet adjusted to revised estimates of numbers of milk cows.

TABLE 393.—*Milk cows: Estimated average price<sup>1</sup> per head received by producers, United States, 1922-1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Aver- age
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1922----	52.83	53.54	54.87	54.46	54.76	54.87	54.20	52.67	52.79	52.86	51.62	53.21	53.56
1923----	54.01	54.15	55.29	56.14	55.91	56.34	56.22	55.45	56.13	55.51	55.30	54.06	55.43
1924----	55.57	55.49	55.88	55.92	56.37	56.45	55.46	55.74	55.54	54.30	55.05	54.00	55.48
1925----	54.81	54.79	56.19	56.85	57.88	57.79	57.95	58.26	58.08	60.17	60.09	60.38	57.87
1926----	62.06	63.41	63.17	65.65	66.63	66.74	66.69	65.37	66.12	66.26	66.91	66.74	65.51
1927----	66.77	68.22	70.18	71.98	72.43	74.19	74.15	74.24	76.10	78.62	81.00	82.36	74.19
1928----	63.11	86.34	87.95	88.55	89.00	89.90	90.37	90.43	92.56	92.86	93.05	92.87	89.75
1929----	91.54	91.77	92.80	93.55	94.94	95.29	96.34	95.26	95.55	95.12	94.48	92.61	94.10
1930----	89.17	85.02	81.00	80.70	70.53	77.62	71.75	65.91	66.23	66.37	64.68	62.00	74.16
1931----	59.90	56.88	56.34	56.53	54.45	51.50	49.47	47.85	46.68	45.58	45.90	44.17	51.28

Bureau of Agricultural Economics. Monthly prices by States, weighted by number of milk cows Jan. 1, to obtain a price for the United States; yearly price is a simple average of 12 months. For previous data see 1930 or earlier Yearbooks.

<sup>1</sup> As reported by country dealers.

TABLE 394.—*Average production, cost, and value per cow of butterfat and milk, classified on butterfat basis, 12 months records completed in 1930 by dairy-herd-improvement associations*

Cows	Milk	Butter- fat	Price of product per pound	Value of product	Cost of rough- age	Cost of grain	Total feed cost	Value of product over feed cost	Return for \$1 spent for feed	Feed cost per pound of but- terfat	Feed cost per 100 pounds of milk
<i>Number</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
157	221	10	0.78	8	24	12	36	<sup>1</sup> -28	0.22	3.60	16.29
611	1,331	54	.68	37	27	16	43	<sup>1</sup> -6	.86	.80	3.23
2,366	2,068	106	.65	69	31	20	51	18	1.35	.48	1.91
9,838	3,942	155	.63	97	33	24	57	40	1.70	.37	1.45
27,936	5,219	203	.62	125	35	28	63	62	1.98	.31	1.21
49,218	6,425	251	.62	155	37	35	72	83	2.15	.29	1.12
56,787	7,601	299	.61	184	39	39	78	106	2.36	.26	1.03
44,075	8,732	348	.61	214	40	44	84	130	2.55	.24	.96
25,618	9,886	397	.61	244	41	48	89	155	2.74	.22	.90
11,790	10,977	446	.62	275	43	56	99	178	2.78	.22	.90
4,530	12,200	496	.63	311	45	63	108	203	2.88	.22	.89
1,723	13,369	545	.64	348	47	71	118	230	2.95	.22	.88
616	14,684	596	.65	396	51	80	130	256	2.97	.22	.89
224	16,203	648	.68	440	56	91	147	293	2.99	.23	.91
75	17,469	695	.62	430	53	94	147	293	2.99	.23	.91
34	18,523	744	.65	485	63	108	156	329	3.11	.21	.84
22	19,752	800	.69	552	63	121	184	368	3.00	.23	.93
6	18,432	849	.53	448	53	115	168	280	2.67	.20	.91
7	23,229	894	.69	615	77	151	228	387	2.70	.26	.98
1	27,765	972	.60	583	43	98	141	442	4.13	.15	.51
Average	7,642	303	.62	187	30	40	70	108	2.37	.26	1.03

Bureau of Dairy Industry.

<sup>1</sup> Minus (-) sign indicates loss.

TABLE 395.—*Dairy products: Quantity produced, 1923-1930*

Product	1923	1924	1925	1926	1927	1928	1929	1930
	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
Creamery butter.....	1,252,214	1,356,080	1,361,526	1,451,766	1,496,495	1,487,049	1,597,027	1,595,281
Whey butter (made from whey cream).....	1,904	1,665	1,774	2,872	1,217	1,097	1,221	2,516
Renovated or process butter..	2,802	2,813	2,519	2,505	4,286	2,716	2,531	1,880
American cheese:								
Whole milk.....	308,108	324,695	347,240	335,915	307,777	335,253	370,314	378,816
Part skim.....	2,145	2,470	2,793	2,927	3,360	2,900	4,951	3,653
Full skim.....	2,033	1,005	3,295	1,884	1,888	3,048	1,074	669
Swiss cheese (including block)..	24,555	21,844	23,457	20,883	18,141	16,718	19,406	26,393
Brick and Munster cheese.....	33,260	32,052	34,101	31,048	31,546	28,960	31,763	33,548
Limburger cheese.....	7,100	9,734	9,163	9,639	8,842	7,437	8,568	8,473
Cream and Neufchatel cheese..	10,334	14,945	17,575	18,192	25,962	30,589	34,405	33,213
All Italian varieties of cheese..	2,132	1,973	1,662	2,425	3,377	3,587	5,948	8,573
All other varieties of cheese..	5,040	4,622	4,325	5,003	5,763	9,027	7,504	7,029
Cottage, pot, and bakers' cheese.....	35,527	54,347	59,485	67,977	75,679	87,525	94,941	97,641
Condensed milk (sweetened):								
Case goods—								
Skimmed.....	2,748	2,044	3,135	1,208	1,623	1,366	1,632	2,092
Unskimmed.....	196,058	187,281	186,507	154,944	161,355	139,077	145,922	121,626
Bulk goods—								
Skimmed.....	102,236	96,581	114,108	147,473	143,722	154,723	202,475	158,971
Unskimmed.....	44,860	47,429	44,758	55,737	39,693	38,660	51,689	62,421
Total condensed milk..	345,902	333,335	348,808	350,462	346,368	333,826	401,715	345,110
Evaporated milk (unsweet- ened):								
Case goods—								
Skimmed.....	7,035	11,555	5,994	11,985	8,100	10,618		1,650
Unskimmed.....	1,252,520	1,189,755	1,202,456	1,158,476	1,273,815	1,337,022	1,499,644	1,440,149
Bulk goods—								
Skimmed.....	77,416	83,131	86,954	116,758	126,085	147,625	153,624	156,212
Unskimmed.....	92,008	82,772	113,556	86,533	101,354	89,336	151,662	128,208
Total evaporated milk..	1,428,979	1,367,213	1,408,960	1,374,052	1,509,354	1,584,601	1,804,930	1,735,214
Condensed or evaporated buttermilk.....	54,833	66,837	77,079	86,687	99,180	102,452	107,288	96,431
Dried or powdered butter- milk.....	13,032	18,068	20,246	31,378	38,435	45,502	54,215	64,601
Powdered whole milk.....	6,560	7,887	8,931	10,768	11,464	9,605	13,202	15,440
Powdered skimmed milk.....	62,251	69,219	73,317	91,718	118,123	147,990	207,579	260,675
Powdered cream.....	328	1,018	339	331	838	673	294	400
Dried casein (skim milk or buttermilk product).....	14,548	20,759	16,660	16,953	18,063	22,151	30,537	41,965
Malted milk.....	15,331	15,889	18,050	20,673	22,116	21,128	22,850	22,691
Milk sugar (crude).....	2,872	3,331	5,655	4,476	4,077	5,323	8,965	12,779
Ice cream of all kinds (gal- lons).....	173,412	181,564	214,382	215,245	226,756	232,185	254,618	240,750

Bureau of Agricultural Economics. Compiled from reports of factories made direct to the bureau. The 1929 and 1930 statistics are the most complete since these reports were inaugurated in 1918. Some allowance, therefore, should be made for this when comparing 1929 and 1930 production with that of previous years.

TABLE 396.—*Dairy products: Quantity produced, 1930, by months*

Manufactured product	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>
Creamery butter.....	108,382	102,322	116,678	133,271	134,355	138,783	167,559	137,420	122,650	120,247	101,974	111,694	1,566,231
Whey butter (made from whey cream).....	108,109	116	142	147	136	143	181	247	210	185	137	110	2,616
Renovated or process butter.....	132	106	147	168	136	143	181	247	210	185	137	114	1,850
Animal cheese:													
Whole milk.....	23,606	23,031	28,602	34,143	48,545	53,887	46,583	33,555	20,705	23,381	18,781	18,838	373,816
Part skim.....	320	277	335	337	380	383	319	326	294	222	231	231	3,653
Full skim.....	28	17	29	68	97	106	130	83	38	32	12	4	669
Swiss cheese (including block).....	272	316	519	1,365	3,700	4,336	4,164	3,648	2,979	2,669	1,666	950	26,393
Brick and Münster cheese.....	2,831	2,368	2,914	3,162	3,646	3,492	2,801	2,367	2,333	2,668	2,625	2,691	33,548
Limburger cheese.....	399	389	884	739	1,040	1,165	1,013	781	679	695	618	421	8,473
Cheddar and Neuchâtel cheese.....	3,228	2,797	3,659	2,821	2,744	2,857	2,432	2,424	2,369	2,636	2,615	2,722	33,213
All other varieties.....	603	679	748	868	939	862	839	756	695	676	667	551	8,673
All other varieties.....	620	662	676	627	612	643	623	649	650	622	488	478	8,729
Confined and Baker's cheese.....	7,523	7,645	9,100	8,972	9,567	9,231	8,351	7,869	7,313	7,655	7,186	7,239	97,641
Condensed milk (sweetened):													
Case goods.....	209	182	131	207	246	248	112	132	163	178	176	88	2,062
Skimmed.....	12,195	11,007	12,816	17,263	10,329	10,051	9,231	7,046	5,801	9,164	7,960	8,758	121,626
Whole milk.....	11,293	10,312	13,177	14,786	20,180	18,975	14,288	11,366	9,977	13,263	10,517	10,837	153,971
Evaporated milk (unsweetened):	4,744	4,569	4,270	4,553	8,683	8,532	5,264	5,311	4,557	4,040	3,624	3,828	62,421
Case goods.....	251	238	325	213	246	116	47	39	24	51	57	43	1,060
Skimmed.....	93,536	92,429	113,277	134,188	174,906	183,562	153,949	117,440	97,249	100,380	89,790	98,163	1,446,149
Whole milk.....	8,925	9,773	11,614	14,070	18,114	18,798	16,172	13,694	10,880	13,283	10,744	10,235	156,212
Concentrated skim milk (for animal feed).....	7,946	7,997	9,799	10,153	14,413	14,413	14,413	12,182	9,603	9,808	8,267	7,862	128,203
Condensed or evaporated buttermilk.....	1,861	1,716	1,449	1,761	1,761	1,761	1,761	1,761	1,761	1,761	1,761	1,761	23,162
Dried or powdered buttermilk.....	6,695	6,218	5,175	5,593	7,933	7,149	6,493	5,493	6,779	6,612	7,325	7,119	93,431
Powdered whole milk.....	4,282	4,401	5,175	5,593	7,933	7,149	6,493	5,493	6,779	6,612	7,325	7,119	93,431
Powdered skim milk.....	577	621	1,040	1,616	2,636	2,636	1,883	1,525	1,616	1,616	1,616	1,616	15,440
Powdered whole milk.....	17,137	16,131	19,981	22,208	26,060	30,013	26,013	21,503	18,531	19,844	19,408	20,886	260,676
Powdered cream.....	2,962	2,889	2,565	2,96	80	126	39	28	24	24	24	24	400
Dried caseln.....	2,113	2,025	2,429	2,044	5,013	5,195	4,024	3,274	2,793	2,947	2,409	2,844	41,966
Malted milk.....	927	835	1,029	1,200	1,148	1,905	1,731	1,793	1,489	1,877	1,588	1,914	22,691
Milk sugar (grade).....	9,977	11,992	14,678	19,421	28,017	33,465	38,070	30,901	22,310	13,043	10,167	8,613	240,780
Ice cream (all kinds), gallons.....													

Bureau of Agricultural Economics. Compiled from reports made direct to the bureau.

TABLE 397.—*Fluid milk and cream: Receipts<sup>1</sup> at New York, Philadelphia, Boston, and Chicago, by State of origin—1930 and 1931*(40-quart units)<sup>2</sup>

State or origin	New York		Philadelphia		Boston		Chicago
	1930	1931	1930	1931	1930	1931	1931
Fluid milk:							
Connecticut.....	206,080	226,755	—	—	40,051	5,965	—
Delaware.....	5,916	20,745	558,870	509,171	—	—	—
Indiana.....	—	521	—	—	—	—	—
Maine.....	190	—	—	—	404,858	653,089	—
Maryland.....	129,673	130,314	883,395	897,193	—	—	—
Massachusetts.....	100,046	142,939	—	—	656,230	628,173	—
New Hampshire.....	—	—	—	—	786,959	778,265	—
New Jersey.....	1,098,490	820,525	497,308	531,023	—	—	—
New York.....	26,656,903	24,316,614	9,587	3,019	593,855	515,957	—
Ohio.....	1,356	12,517	6,290	1,110	—	—	—
Pennsylvania.....	4,880,082	5,195,697	5,298,624	5,194,375	—	—	—
Rhode Island.....	—	—	—	—	291	—	—
Vermont.....	1,233,618	1,203,051	—	—	3,633,198	3,834,563	—
Virginia.....	—	—	41,104	37,120	—	—	—
West Virginia.....	—	—	99,829	69,076	—	—	—
Wisconsin.....	200	—	310	691	—	—	—
Canada.....	13,874	5,170	—	—	—	—	—
Total.....	34,328,277	32,164,848	7,395,317	7,243,678	6,176,942	6,416,012	—
Fluid cream:							
Alabama.....	—	—	—	—	—	4,850	—
Arkansas.....	—	—	2,421	400	—	899	1,714
Connecticut.....	616	6,152	—	—	146	—	—
Delaware.....	7,182	826	4,371	6,085	—	—	—
Illinois.....	65	—	2,764	2,000	200	1,400	259,300
Indiana.....	1,016	600	73,237	97,298	7,300	12,897	16,606
Iowa.....	7,855	14,130	—	—	—	—	5,299
Kansas.....	192	—	400	—	—	—	380
Kentucky.....	—	—	1,268	—	1,400	2,495	—
Maine.....	1,400	—	4,822	1,200	—	6,210	8,875
Maryland.....	2	—	—	—	101,910	75,005	—
Massachusetts.....	3,300	886	39,214	25,403	—	200	—
Michigan.....	6,441	2,215	—	—	1,976	1,678	—
Minnesota.....	1,830	250	17,292	6,500	8,392	20,079	43,094
Mississippi.....	6,316	5,483	19,334	3,018	7,201	7,335	80
Missouri.....	217	—	200	—	—	—	5
New Hampshire.....	4,415	850	15,367	7,888	8,008	19,783	26,102
New Jersey.....	—	—	—	—	29,830	21,918	—
New York.....	16,212	18,275	589	1,991	—	—	—
North Dakota.....	1,350,342	1,517,191	3,083	21,004	35,844	58,684	—
Ohio.....	—	—	—	—	—	—	1
Oklahoma.....	21,904	17,969	29,260	23,894	11,690	17,220	8,062
Pennsylvania.....	—	—	1,450	—	—	—	130
Rhode Island.....	251,630	225,457	46,292	41,719	—	500	—
Tennessee.....	—	—	—	—	5	—	—
Texas.....	13,135	6,704	4,756	2,155	600	13,523	3
Vermont.....	200	—	1,748	1,145	—	—	1
Virginia.....	95,844	78,630	—	—	321,657	266,386	—
West Virginia.....	—	—	31,172	9,837	—	—	1
Wisconsin.....	—	—	1,989	6,695	—	—	—
Canada.....	18,049	3,645	92,010	75,687	14,120	57,039	527,834
Canada.....	31,152	1,339	—	—	31,883	—	—
Total.....	1,842,405	1,898,602	393,029	333,875	582,446	588,110	896,996

Bureau of Agricultural Economics.

<sup>1</sup> Figures include both rail and truck receipts at Philadelphia and Boston, but rail receipts only at New York and Chicago. Receipts by truck at New York in 1931 were: Milk, 3,370,129 cans; cream, 14,793 cans. In 1930, milk, 2,141,514 cans; cream, 4,601 cans.

<sup>2</sup> 40-quart units equal 10 gallons, or about 86 pounds for milk and about 82.5 pounds for cream.

TABLE 398.—*Milk, condensed and evaporated: International trade; average 1925-1929, annual 1927-1930*

Country	Calendar year									
	Average 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports
<b>PRINCIPAL EXPORTING COUNTRIES</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
Netherlands.....	319, 831	291	324, 800	279	354, 572	359	378, 050	139	393, 151	695
United States.....	118, 215	2, 830	103, 028	2, 624	115, 551	2, 608	110, 185	2, 631	90, 459	1, 611
Switzerland.....	76, 691	35	81, 284	11	82, 252	14	78, 475	13	72, 660	15
Denmark.....	55, 666	17	55, 304	14	52, 507	13	54, 924	2	51, 916	-----
Canada.....	32, 288	142	33, 080	125	27, 118	137	26, 740	179	20, 471	164
Australia <sup>2</sup> .....	20, 852	70	15, 725	98	19, 975	27	17, 395	52	-----	-----
Norway.....	18, 462	789	16, 698	747	18, 747	646	15, 534	323	13, 447	111
Italy.....	9, 842	1, 335	8, 905	1, 335	7, 093	1, 728	4, 821	2, 124	5, 141	1, 751
Irish Free State.....	8, 558	1, 598	6, 302	1, 494	10, 747	1, 282	10, 503	1, 110	10, 321	909
Belgium <sup>3</sup> .....	2, 582	2, 037	2, 615	998	3, 516	1, 296	4, 369	4, 099	7, 300	5, 554
Czechoslovakia.....	1, 535	364	315	141	2, 753	228	2, 830	271	2, 754	223
New Zealand <sup>4</sup> .....	1, 494	23	1, 557	3	1, 567	3	2, 175	7	2, 331	1
<b>Total.....</b>	<b>606, 116</b>	<b>9, 531</b>	<b>650, 163</b>	<b>7, 867</b>	<b>696, 288</b>	<b>8, 341</b>	<b>706, 026</b>	<b>10, 969</b>	<b>670, 041</b>	<b>11, 034</b>
<b>PRINCIPAL IMPORTING COUNTRIES</b>										
United Kingdom.....	21, 866	280, 504	27, 771	283, 789	25, 046	301, 978	27, 732	290, 501	22, 441	291, 010
Cuba.....	0	47, 460	0	50, 589	0	44, 340	0	40, 492	0	38, 767
Dutch East Indies.....	15	27, 265	0	26, 149	0	30, 875	0	34, 990	0	33, 416
Philippine Islands.....	0	25, 810	0	25, 974	0	26, 524	0	29, 875	0	29, 077
British India.....	0	22, 305	0	24, 933	0	26, 554	0	27, 436	0	27, 280
Germany <sup>5</sup> .....	1, 960	15, 079	980	13, 434	1, 477	13, 290	4, 235	8, 264	6, 772	4, 351
France.....	9, 174	13, 793	9, 454	11, 299	12, 453	12, 271	11, 520	14, 477	14, 608	14, 964
China.....	0	12, 227	0	11, 095	0	14, 645	0	13, 285	0	11, 353
Union of South Africa.....	27	11, 306	29	11, 330	45	12, 020	16	12, 132	447	4, 810
Japan.....	320	9, 171	399	9, 510	385	8, 411	317	8, 805	780	8, 806
Peru.....	0	3, 593	0	7, 629	0	8, 444	0	8, 607	0	-----
Siam <sup>6</sup> .....	0	7, 076	0	7, 847	0	8, 327	0	8, 447	0	-----
Indo-China.....	162	6, 780	174	5, 955	129	7, 008	72	7, 706	-----	-----
Greece.....	0	6, 644	0	7, 062	0	8, 043	0	7, 879	0	7, 218
Jamaica.....	0	4, 198	0	4, 103	0	4, 614	0	5, 084	0	5, 129
Algeria.....	155	3, 768	129	3, 652	206	5, 291	144	5, 094	-----	-----
Trinidad and Tobago.....	0	3, 181	0	3, 132	0	3, 706	0	3, 850	0	4, 130
Tunis.....	0	2, 943	0	2, 644	0	2, 707	0	2, 652	0	3, 113
Brazil.....	0	1, 431	0	1, 947	0	1, 355	0	1, 252	0	1, 204
Argentina.....	15	1, 418	28	1, 446	12	1, 353	15	1, 578	17	1, 550
Egypt.....	353	1, 356	351	1, 385	368	1, 347	504	1, 526	123	1, 503
Austria.....	213	1, 214	264	1, 105	349	1, 205	371	1, 247	670	1, 584
Poland.....	34	327	22	264	18	464	1	385	7	267
<b>Total.....</b>	<b>34, 204</b>	<b>513, 258</b>	<b>39, 591</b>	<b>516, 300</b>	<b>40, 511</b>	<b>545, 965</b>	<b>44, 927</b>	<b>548, 726</b>	<b>45, 877</b>	<b>488, 732</b>

Bureau of Agricultural Economics. Official sources except where otherwise stated.

<sup>1</sup> Preliminary.<sup>2</sup> International Yearbook of Agricultural Statistics.<sup>3</sup> Exports include powdered milk.<sup>4</sup> Imports include powdered milk.<sup>5</sup> Includes some powdered milk.<sup>6</sup> Figures for 12 months ending March 31 of following year.TABLE 399.—*Milk: Estimated average price per 100 pounds received by producers, United States, 1923-1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15
	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>	<i>Dolls.</i>
1923.....	2.86	2.84	2.75	2.60	2.40	2.40	2.29	2.18	2.35	2.43	2.45	2.52
1924.....	2.48	2.55	2.62	2.48	2.47	2.47	2.45	2.55	2.56	2.73	2.69	2.65
1925.....	2.74	2.63	2.56	2.46	2.39	2.35	2.40	2.37	2.47	2.46	2.60	2.61
1926.....	2.68	2.64	2.55	2.53	2.51	2.44	2.40	2.36	2.48	2.55	2.56	2.64
1927.....	2.67	2.69	2.61	2.51	2.49	2.45	2.45	2.46	2.56	2.60	2.63	2.65
1928.....	2.64	2.64	2.63	2.59	2.53	2.47	2.46	2.50	2.52	2.55	2.59	2.60
1929.....	2.53	2.44	2.38	2.35	2.28	2.22	2.15	2.18	2.25	2.30	2.31	2.20
1930.....	2.04	1.96	1.92	1.85	1.73	1.66	1.62	1.64	1.70	1.72	1.73	1.67
1931.....	2.04	1.96	1.92	1.85	1.73	1.66	1.62	1.64	1.70	1.72	1.73	1.67

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by number of milk cows Jan. 1, to obtain a price for the United States. Prices quoted are for milk sold to dealers, factories, etc.

TABLE 400.—*Milk, standard or grade B: Retail price per quart, delivered to family trade in cities, 1931*

City	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
Boston.....	13½	12½	12½	12½	12½	12½	12½	13½	13½	13½	13½	12½	12½
New York.....	16	15	15	15	15	15	15	15	15	14	14	12	14½
Philadelphia.....	12	12	12	12	12	12	12	12	11	11	11	11	11½
Pittsburgh.....	13	12	12	12	12	12	12	12	12	11	11	9	12½
Cleveland.....	11	11	11	12	12	11	10	10	10	10	10	10	10½
Indianapolis.....	11	11	10	10	10	10	10	10	10	10	10	10	10½
Chicago.....	13	13	13	13	13	13	13	13	13	13	13	13	13
Detroit.....	13	12	12½	12	12	11	10	11	12	12	11	11	11½
Milwaukee.....	10	10	10	10	10	10	10	10	10	10	10	9	9½
Minneapolis.....	10	10	10	10	10	10	10	10	10	10	10	10	10
St. Louis.....	12	12	12	12	12	12	12	12	11	11	11	11	11½
Kansas City, Mo.....	13	13	13	13	12	12	12	12	12	12	12	11	12½
Washington, D. C.....	14½	14½	14½	14	14	14	14	14	14	14	14	14	14½
Jacksonville.....	12	11	19	15½	15½	15½	13½	15	13½	14½	14½	14½	15½
Louisville.....	12	11	10	10	11	11	11	12	12	12	12	12	11½
Birmingham.....	16	16	14	14	14	12	12	12	13	13	13½	13	13½
New Orleans.....	14	14	14	14	12	12	12	12	12	12	12	12	12½
Dallas.....	13	12	12	12	12	10	10	10	10	10	10	10	10
Butte.....	10	10	13	13	13	13	12	12	12	12	12	12	12
Denver.....	13	13	13	13	13	13	13	13	13	13	13	13	13
Salt Lake City.....	10	10	10	10	10	10	10	10	10	10	10	9½	10
Seattle.....	11	11	11	10½	10½	10½	10½	10½	10½	10½	10½	11	10½
Portland, Oreg.....	11½	11	11	10½	10	10	10	10	10	10	10	10	10
Los Angeles.....	13	13	13	13	13	13	13	13	12	12	12	12	12
San Francisco.....	13½	13	13	13	13	13	13	10	10	10	10	10	11½

Bureau of Agricultural Economics. Compiled from reports of the bureau secured through the cooperation of milk distributors, producers' associations, and municipal officers.

TABLE 401.—*Butterfat: Estimated average price per pound received by producers, United States, 1922-1931*

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weighted average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1922.....	33.4	34.0	34.5	33.4	33.4	33.0	34.8	32.8	35.5	39.2	44.2	50.8	35.9
1923.....	47.0	44.9	44.9	46.0	40.3	36.9	36.7	38.7	42.2	44.1	47.8	49.2	42.2
1924.....	50.6	48.5	46.4	40.8	37.6	37.1	37.8	35.8	36.6	36.6	37.0	41.1	39.8
1925.....	40.6	37.9	41.5	40.5	40.3	39.9	40.5	41.3	42.6	47.1	47.8	47.6	41.9
1926.....	45.2	43.1	42.9	40.4	39.1	39.3	38.6	38.6	40.5	42.4	44.8	47.9	41.3
1927.....	40.9	46.8	48.0	47.1	43.6	40.8	40.3	39.4	41.0	44.4	45.8	47.8	43.7
1928.....	43.5	40.0	46.5	45.4	44.4	43.5	43.3	44.3	46.5	47.0	47.6	49.2	45.6
1929.....	47.6	47.8	48.3	46.5	45.4	43.6	43.4	43.3	44.0	45.6	43.5	41.9	44.9
1930.....	36.7	35.4	34.9	37.3	36.5	31.6	31.6	35.2	37.7	37.0	36.3	30.6	34.8
1931.....	26.2	26.0	27.5	26.4	21.2	20.5	21.1	23.9	26.0	30.3	28.2	27.3	24.7

Bureau of Agricultural Economics. Quotations cover butterfat for all uses. Based on reports of special price reporters. Monthly prices by States, weighted by number of milk cows Jan. 1, to obtain a price for the United States; yearly prices obtained by weighting monthly prices by production of creamery butter.

TABLE 402.—*Creamery butter: Production reported by factories, United States 1922-1930*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>
1922.....	73,505	67,405	70,532	86,623	132,351	150,034	135,231	114,160	92,359	83,070	68,028	70,617	1,153,515
1923.....	83,688	74,134	88,311	100,547	124,350	158,371	138,278	120,802	102,273	89,297	74,909	77,254	1,242,214
1924.....	87,468	86,731	95,760	106,012	139,954	161,992	164,443	137,836	115,102	100,530	77,282	82,964	1,356,080
1925.....	87,121	80,218	92,302	107,023	145,478	164,253	158,920	136,788	108,325	104,520	85,492	91,130	1,361,626
1926.....	97,893	94,222	112,432	121,049	155,912	178,276	159,554	133,294	116,732	103,068	88,481	90,853	1,451,766
1927.....	97,965	95,522	111,451	126,415	168,808	188,792	170,484	146,808	113,546	102,309	86,058	88,247	1,496,495
1928.....	101,045	90,394	111,777	118,849	156,294	181,037	167,601	145,430	119,499	105,894	87,745	92,424	1,487,049
1929.....	103,519	99,963	114,404	133,684	174,341	192,869	185,317	152,192	123,582	118,116	97,186	101,854	1,597,027
1930.....	106,382	102,252	115,679	133,271	184,385	189,788	167,559	137,420	122,580	120,247	101,974	111,094	1,505,231

Bureau of Agricultural Economics. The 1929 and 1930 statistics are the most complete since these reports were inaugurated in 1918. Some allowance, therefore, should be made for this when comparing 1929 and 1930 production with that of previous years.

TABLE 403.—*Creamery butter production in factories in the United States, by States, 1922-1930*

State	1922	1923	1924	1925	1926	1927	1928	1929	1930
	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
Maine.....	596	402	568	479	547	517	348	250	202
New Hampshire.....	309	424	271	137	90	72	44	28	22
Vermont.....	12,289	11,635	12,294	9,872	8,305	6,732	5,469	3,776	3,581
Massachusetts.....	2,999	1,844	1,790	2,026	2,150	2,514	2,340	1,496	1,869
Rhode Island.....	76	76	105	68	75	100	66	48	28
Connecticut.....	986	753	820	675	617	550	401	371	364
New England.....	17,255	15,434	15,848	12,757	11,784	10,485	8,668	5,975	6,006
New York.....	25,474	18,893	25,974	16,960	14,222	12,864	11,557	9,104	9,617
New Jersey.....	261	437	642	170	49	101	15	14	41
Pennsylvania.....	12,803	13,142	12,444	11,476	11,808	11,709	11,349	11,113	10,766
Middle Atlantic.....	38,538	32,472	39,060	28,606	26,079	24,674	22,921	20,231	20,424
Ohio.....	84,193	79,195	80,932	77,566	79,386	79,603	75,681	80,583	78,972
Indiana.....	48,158	51,484	54,355	54,362	57,592	62,436	60,409	62,701	63,249
Illinois.....	47,249	51,359	58,225	56,872	62,544	59,875	62,864	69,272	65,281
Michigan.....	59,954	64,818	70,676	70,729	72,040	69,368	65,803	63,426	65,926
Wisconsin.....	142,255	139,895	153,335	161,369	159,733	153,545	137,483	155,615	171,044
North Cent. E.....	381,789	386,751	417,523	420,898	431,295	424,827	402,240	431,707	445,072
Minnesota.....	170,463	199,926	229,474	245,669	268,437	274,880	271,345	282,884	282,540
Iowa.....	129,778	141,407	159,378	156,361	168,827	177,224	196,068	214,662	210,058
Missouri.....	46,565	51,518	56,801	55,953	60,861	62,540	60,201	52,505	77,893
North Dakota.....	21,675	23,355	28,515	31,500	34,898	32,462	30,839	41,889	41,032
South Dakota.....	21,146	27,447	24,643	29,193	29,514	32,343	34,853	40,381	40,406
Nebraska.....	74,809	76,749	81,423	83,930	90,882	95,004	96,472	97,110	85,623
Kansas.....	40,204	42,674	46,844	47,768	50,998	50,667	55,756	58,967	56,919
North Cent. W.....	504,640	563,875	627,078	650,374	710,717	725,609	754,584	818,278	800,517
Delaware.....	203	154	150	80	67	50	47	42	41
Maryland.....	542	382	500	330	266	229	223	172	95
Dist. of Columbia.....	475	10		461	52				
Virginia.....	3,118	4,231	4,614	3,842	4,378	5,881	6,051	5,882	5,255
West Virginia.....	420	276	466	533	487	287	325	381	462
North Carolina.....	1,549	1,718	1,683	1,556	1,680	2,032	1,849	2,180	2,050
South Carolina.....	165	537	527	429	364	432	392	496	453
Georgia.....	979	1,868	1,826	1,836	1,982	3,044	2,224	2,124	2,397
Florida.....	81	99	20	22	105	129	153	93	107
South Atlantic.....	7,532	9,275	9,786	9,098	9,381	12,084	11,264	11,379	10,880
Kentucky.....	12,010	12,244	12,942	14,087	16,975	19,364	19,822	20,050	17,645
Tennessee.....	9,164	11,463	12,762	11,286	11,826	17,190	15,333	17,929	15,745
Alabama.....	917	831	839	1,086	991	1,237	991	2,041	2,061
Mississippi.....	5,778	5,715	5,648	4,895	6,896	7,920	7,241	7,429	6,048
South Cent. E.....	27,869	30,253	32,191	31,354	36,688	45,711	43,387	47,449	41,598
Arkansas.....	731	996	1,259	1,174	1,325	1,710	1,115	2,778	2,039
Louisiana.....	87	185	125	90	92	324	461	882	705
Oklahoma.....	11,142	14,065	14,421	15,841	19,064	23,617	24,277	25,770	24,654
Texas.....	10,179	10,956	11,997	10,866	14,594	24,276	20,599	26,511	26,083
South Cent. W.....	22,139	26,202	27,802	27,971	35,675	49,927	46,452	55,941	52,481
Wyoming.....	1,403	1,894	1,941	1,999	2,289	2,009	1,831	2,320	2,255
Colorado.....	16,410	18,625	18,130	18,794	18,255	20,871	21,614	21,024	22,643
New Mexico.....	129	185	251	326	455	447	421	535	951
Idaho.....	7,582	9,883	13,431	15,101	18,460	20,918	20,832	24,017	26,353
Arizona.....	623	600	2,107	1,034	1,459	2,150	2,246	1,922	1,094
Utah.....	5,913	7,500	8,585	7,034	8,037	9,909	9,549	11,008	11,969
Nevada.....	2,642	2,361	2,640	2,563	2,432	2,187	2,211	2,231	1,993
Montana.....	7,713	10,667	13,874	13,968	15,549	16,759	16,364	16,684	16,792
Mountain.....	42,415	51,715	60,959	60,849	66,962	75,250	75,068	80,701	84,950
Washington.....	24,239	26,666	29,331	25,678	28,914	29,870	29,452	30,228	32,256
Oregon.....	17,158	18,128	20,993	21,575	22,870	22,831	20,968	22,413	26,641
California.....	69,941	81,943	75,509	72,371	71,701	75,227	72,050	72,635	74,366
Pacific.....	111,338	126,737	125,833	119,619	123,135	127,928	122,465	125,276	133,263
Total.....	1,153,515	1,242,214	1,356,080	1,361,526	1,451,766	1,496,495	1,487,049	1,597,027	1,595,231

Bureau of Agricultural Economics. The compilations are made from reports of factories to the bureau. The 1929 and 1930 statistics are the most complete since these reports were inaugurated in 1918. Some allowance, therefore, should be made for this when comparing 1929 and 1930 production with that of previous years.

TABLE 404.—*Creamery butter: Receipts, gross weight<sup>1</sup>, at five markets, by months, specified years*

Market and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.
New York:													
1929	19,498	18,873	20,486	21,898	26,751	27,936	29,700	23,854	20,657	20,983	17,082	18,095	265,760
1930	20,877	19,579	21,523	22,868	26,723	29,898	27,567	19,519	19,690	19,431	17,010	22,485	268,070
1931	22,639	21,618	22,237	23,169	25,280	31,434	25,661	18,860	19,334	20,904	20,773	22,282	274,218
Chicago:													
1929	18,158	16,356	18,758	19,056	25,935	30,081	27,119	22,793	17,130	16,832	15,766	16,648	244,632
1930	16,837	16,422	19,877	20,517	27,431	29,585	24,689	18,189	15,979	15,191	14,349	14,769	233,638
1931	16,375	15,584	19,601	21,833	27,102	32,112	24,265	18,354	10,584	17,267	17,508	17,065	243,696
Philadelphia:													
1929	6,781	6,158	7,006	6,745	8,839	9,491	8,918	7,870	6,673	6,309	6,342	6,554	87,346
1930	6,956	6,144	6,674	7,119	8,263	9,183	8,127	6,127	5,942	5,649	5,970	7,602	83,762
1931	7,768	6,972	7,744	8,170	8,536	10,247	7,509	6,468	6,799	6,036	6,000	7,676	90,565
Boston:													
1929	6,091	5,259	5,915	6,656	9,216	10,787	11,063	7,812	5,922	4,652	4,030	3,780	81,183
1930	4,615	4,266	5,225	6,267	8,649	10,899	9,640	6,524	4,691	3,790	3,368	4,534	72,455
1931	5,028	4,911	5,281	6,533	8,163	9,874	8,501	6,537	5,507	5,292	5,664	5,819	77,200
San Francisco:													
1929	1,962	1,911	1,814	2,529	3,138	2,885	2,642	2,074	1,590	1,470	1,569	1,871	25,155
1930	1,590	1,555	1,831	2,566	3,438	2,769	2,639	1,975	1,442	1,467	1,515	1,801	24,738
1931	1,590	1,417	2,148	2,828	3,134	3,009	2,300	2,440	1,859	1,743	1,886	2,298	26,692
Total:													
1922	41,775	39,041	45,101	40,716	67,063	92,632	76,918	60,172	45,577	40,595	37,372	38,401	625,363
1923	47,843	39,877	48,958	47,947	64,328	89,976	75,330	56,243	49,307	45,393	39,759	41,460	646,424
1924	44,476	47,756	52,328	51,690	67,572	91,742	92,086	67,659	56,247	49,780	35,868	30,471	696,905
1925	44,825	41,785	48,351	50,035	67,454	88,024	82,918	68,341	53,303	51,599	42,099	42,993	681,727
1926	46,809	46,809	54,616	53,990	64,653	89,983	81,053	50,849	52,985	45,280	40,588	42,825	679,480
1927	44,750	45,502	53,633	57,298	75,535	80,773	79,670	68,055	50,055	45,425	39,895	30,978	689,575
1928	60,005	47,767	54,300	52,158	63,582	81,318	75,901	64,521	48,907	42,796	43,092	670,958	
1929	52,490	48,557	53,979	56,881	73,870	81,180	79,442	64,103	51,972	50,246	44,739	46,648	704,116
1930	50,875	47,966	55,180	59,127	74,504	82,334	72,662	52,334	47,744	45,528	43,118	51,201	682,663
1931	53,340	50,529	57,011	62,633	72,275	86,076	68,326	52,659	50,083	51,242	52,486	55,130	712,390

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets.

<sup>1</sup> Gross weight includes container and wrapping.

TABLE 405.—*Creamery butter: Cold-storage holdings, United States, 1922-1931*

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
1922	48,412	35,047	22,582	9,113	8,830	13,202	67,410	103,151	112,039	96,680	73,857	47,773
1923	26,819	16,122	8,910	4,824	3,248	10,112	62,708	101,774	102,731	96,117	76,473	51,504
1924	30,209	15,246	9,847	7,842	8,913	22,342	74,184	118,156	140,153	143,404	135,018	100,852
1925	65,604	45,748	28,798	10,875	3,739	13,036	63,687	109,075	128,403	114,172	94,916	74,751
1926	52,785	39,381	20,313	17,392	17,527	30,561	86,897	131,152	138,151	125,312	100,871	61,381
1927	51,347	17,952	7,952	3,011	3,436	25,401	89,996	145,147	163,701	147,390	118,679	83,221
1928	40,289	28,273	14,404	5,718	5,109	15,052	69,750	120,437	130,175	128,071	105,811	70,945
1929	43,783	21,747	11,910	5,532	5,833	28,309	91,902	151,621	108,952	188,841	134,405	111,650
1930	61,935	60,230	46,530	30,556	22,937	50,378	106,522	145,061	143,049	131,489	109,040	84,012
1931	63,401	46,792	30,672	18,010	17,195	35,155	60,172	115,121	104,674	80,162	50,229	42,242

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

<sup>1</sup> Quantities given are net weights.

TABLE 406.—*Butter: Receipts, gross weight,<sup>1</sup> at five markets, by State of origin, 1927-1931*

Market and origin	1927	1928	1929	1930	1931	Market and origin	1927	1928	1929	1930	1931
<b>NEW YORK</b>	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	<b>PHILA.—con.</b>	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.
Ala.	220	370	154	189	110	Iowa.	5,237	4,808	0,440	0,220	0,825
Ark.	84	42	247	153	224	Kans.	370	384	130	70	387
Calif.	161	218	1	82	48	Ky.	313	212	130	111	365
Ga.	38	86	30	137	120	Md.	205	98	85	72	41
Ill.	37,954	35,818	35,738	34,307	35,186	Mich.	1,535	1,358	568	1,342	3,029
Ind.	5,417	5,150	4,890	4,799	5,108	Minn.	45,478	54,427	54,499	52,743	50,804
Iowa.	66,935	63,676	78,347	74,630	74,145	Miss.	498	695	214	268	235
Kans.	3,878	4,707	6,520	7,512	7,136	Mo.	1,444	1,021	2,385	1,767	3,115
Ky.	3,078	584	617	573	549	Neb.	4,341	4,271	5,038	2,524	4,058
Md.	131	223	196	240	15	N. Y.	596	690	529	604	859
Mass.	223	66	15	87	203	N. C.	33	5	98	148	77
Mich.	13,586	15,227	7,556	8,802	12,691	Ohio.	3,162	2,665	1,934	1,854	1,201
Minn.	57,081	44,654	65,333	65,883	62,081	Pa.	1,097	781	012	620	656
Miss.	1,251	312	1,070	629	795	S. Dak.	263	418	582	216	401
Mo.	6,540	6,122	6,573	4,345	5,582	Tenn.	1,969	1,742	2,860	1,967	978
Mont.	238	296	278	387	28	Tex.	69	28	41	222	842
Neb.	28,457	28,138	26,503	26,826	29,877	Va.	335	881	1,289	605	990
N. Y.	252	23	123	1	112	W. Va.	377	225	53	55	06
N. C.	5,385	5,078	5,007	7,119	4,537	Wis.	6,813	3,307	4,585	5,395	4,185
N. Dak.	345	415	428	215	55	Other States	586	290	233	189	640
Ohio.	7,563	7,497	6,217	6,926	7,155	Canada.					24
Okl.	303	502	1,302	771	1,417	<b>Total</b>	<b>81,727</b>	<b>84,495</b>	<b>87,386</b>	<b>83,762</b>	<b>90,586</b>
Pa.	1,025	1,074	1,923	1,982	1,850	<b>BOSTON</b>					
S. Dak.	1,128	1,290	1,503	1,151	1,934	Colo.	22	807	442	83	129
Tenn.	2,369	2,806	2,966	2,465	1,614	Ill.	13,557	12,251	11,893	12,065	13,403
Tex.	359	831	2,304	996	930	Ind.	1,576	1,808	3,495	2,842	2,917
Va.	473	535	457	244	273	Iowa.	3,969	4,261	4,257	4,807	3,173
Wash.	810	26	27	26	26	Kans.	1,532	1,801	1,208	706	567
Wis.	17,015	15,459	15,839	13,917	14,503	Ky.	228	298	580	222	47
Other States	339	419	193	201	165	Mass.	246	168	15	3	90
Canada	89	74	2	47	600	Mich.	1,675	1,787	703	993	1,279
<b>Total</b>	<b>261,322</b>	<b>250,593</b>	<b>265,700</b>	<b>268,070</b>	<b>274,218</b>	Minn.	30,830	33,652	28,908	29,119	32,710
<b>CHICAGO</b>						Mo.	3,151	3,989	3,221	2,408	2,224
Ark.	130	68	155	118	229	Mont.	183	14	29	237	87
Calo.	678	1,815	977	780	242	Neb.	10,335	12,159	12,316	7,438	4,746
Idaho.		7	8	27		N. H.	94	14	3	2	5
Ill.	8,057	6,371	8,408	15,594	20,061	N. Y.	2,607	1,626	1,380	1,208	1,954
Ind.	9,749	943	1,098	1,217	1,375	N. Dak.	1,871	1,227	2,217	930	1,803
Iowa.	89,347	39,948	44,152	39,606	42,450	Ohio.	2,751	2,879	3,214	2,943	4,267
Kans.	9,989	12,981	11,185	9,929	15,283	Okl.	664	575	825	610	904
Ky.	1,884	1,894	2,067	1,353	989	Pa.	240	95	192	81	250
Mich.	1,024	923	854	576	877	S. Dak.	3,526	2,985	2,851	1,911	2,562
Minn.	43,057	50,230	54,043	46,380	39,550	Tenn.			104	119	143
Miss.	194	186	235	143	290	Tex.	27	170	550	251	481
Mo.	13,484	11,608	13,020	12,487	14,866	Vt.	2,318	1,974	781	186	154
Mont.	194	194	166	159	3	Wis.	2,238	2,057	1,679	3,292	2,885
Neb.	17,090	19,498	17,450	16,225	15,136	Other States	872	665	231	441	192
N. Y.	81	275	35	107	28	Canada.	5	2			
N. Dak.	4,131	2,919	2,287	2,384	3,053	<b>Total</b>	<b>84,617</b>	<b>87,321</b>	<b>81,183</b>	<b>72,455</b>	<b>77,200</b>
Ohio.	194	128	78	251	607	<b>SAN FRAN-</b>					
Okl.	4,510	2,329	3,175	3,104	4,507	<b>CISCO</b>					
S. Dak.	10,513	18,270	16,187	13,496	12,855	Calif.	18,970	17,732	19,070	18,110	18,473
Tenn.	438	113	166	75	31	Colo.	406	260	159	93	144
Tex.	3,680	2,322	2,325	1,453	2,020	Idaho.	1,722	1,255	1,301	1,223	1,515
Wash.	64,611	58,108	65,356	68,047	68,190	Mont.	2,173	2,150	1,222	2,018	1,424
Other States	324	150	134	98	153	Neb.	77	33	81	87	87
Canada						Nov.	113	74	41	184	14
<b>Total</b>	<b>235,200</b>	<b>230,514</b>	<b>244,632</b>	<b>233,638</b>	<b>243,695</b>	Ore.	2,253	1,796	2,748	2,489	3,687
<b>PHILADELPHIA</b>						Utah.	223	384	134	35	88
Ala.	168	30	26	17	103	Wash.	300	182	231	495	1,840
Ill.	4,807	3,811	4,023	4,652	9,166	Other States	466	166	108	4	29
Ind.	1,736	1,502	1,522	1,647	1,298	Canada.					
<b>Total</b>	<b>26,709</b>	<b>24,032</b>	<b>25,155</b>	<b>24,738</b>	<b>26,692</b>						

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets.

<sup>1</sup> Gross weight includes container and wrapping.

TABLE 407.—*Butter: International trade, average 1925-1929, annual 1927-1930*

Country	Calendar year									
	Average 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Ex- ports	Im- ports	Exports	Im- ports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EX- PORTING COUNTRIES	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Denmark	310,967	1,886	315,721	1,826	325,710	1,621	350,616	1,424	372,553	1,388
New Zealand	156,179	6	163,020	0	162,352	0	185,226	1	211,035	1
Australia <sup>2</sup>	100,464	3,448	75,088	10,935	112,811	2,561	102,913	4		
Netherlands	100,310	4,648	105,714	4,041	103,485	5,123	104,323	4,469	92,393	4,396
Russia	62,901	0	71,747	0	71,888	0	55,933	0	23,197	0
Argentina	50,410	7	46,808	3	44,182	7	37,547	2	51,156	7
Irish Free State	58,409	6,215	65,576	4,836	62,623	5,879	62,774	4,478	58,766	3,391
Sweden	37,607	133	40,707	63	38,679	93	54,960	24	58,805	19
Finland	31,509	42	33,238	2	29,488	3	36,610	3	37,726	
Latvia	24,641	0	23,724	0	28,673	0	32,694	0	40,633	0
Estonia	21,439	6	21,839	0	24,741	31	27,247	1	31,010	0
Poland	17,426	350	16,261	141	24,194	77	33,248	112	26,713	30
France	15,848	6,796	21,089	10,851	22,227	5,217	16,722	9,763	12,095	12,822
Italy	3,985	1,600	2,805	2,085	1,779	3,565	1,651	1,937	1,843	3,131
Yugoslavia	571	2	769	1	482	0	635	0	655	1
Total	992,666	25,039	1,004,056	34,737	1,053,314	24,177	1,103,099	22,208	1,018,580	25,286
PRINCIPAL IM- PORTING COUNTRIES										
United Kingdom	1,465	647,350	1,703	625,144	1,395	666,281	1,098	702,749	1,115	744,623
Germany	275	249,016	191	238,682	281	279,000	337	298,821	578	298,587
Switzerland	155	18,070	169	18,727	150	18,661	158	16,650	40	18,795
Canada	8,510	14,638	2,696	11,209	1,995	16,802	1,400	35,928	1,180	38,606
Dutch East Indies	0	9,758	0	9,169	0	11,086	0	11,098	0	10,910
United States	4,558	6,227	4,343	8,460	3,898	4,659	3,721	2,773	2,954	2,472
Belgium	2,490	5,848	2,957	2,559	3,712	2,917	3,009	9,569	2,648	22,413
Austria	932	2,921	440	4,220	1,094	1,785	2,211	1,099	4,111	544
Union of South Africa	839	2,420	334	2,920	393	3,921	2,337	1,604	2,904	1,690
Egypt	53	2,341	86	2,552	51	1,774	30	2,158	23	2,935
Algeria	48	2,055	148	2,124	141	2,496	164	2,317		
Norway	421	1,846	25	2,511	82	1,533	1,191	1,352	236	1,529
British Malaya	187	1,811	153	1,763	181	2,196	177	1,930	193	2,067
Cuba	5	1,780	0	1,878	3	1,204	21	992	38	448
Peru	5	1,708	9	1,444	2	2,116	2	1,481	4	
China	0	1,661	0	1,530	0	1,915	0	1,372	0	1,417
Greece	0	1,251		1,625	0	1,172		1,537		1,420
Philippine Islands	0	1,200	0	1,072	0	1,412	0	1,335	0	1,188
Czechoslovakia	605	1,171	369	1,683	1,290	990	716	835	695	714
Trinidad and Tobago	0	1,139	0	1,344	0	823	0	1,521	0	1,058
Spain	328	363	303	337	170	467	177	409	160	329
Total	20,876	974,577	13,816	940,953	14,744	1,022,500	16,650	1,097,529	16,879	1,146,715

Bureau of Agricultural Economics. Official sources except where otherwise noted. Butter includes all butter made from milk, melted and renovated butter, but does not include margarine, cocoa butter or ghee.

<sup>1</sup> Preliminary.

<sup>2</sup> International Yearbook of Agricultural Statistics.

<sup>3</sup> 2-year average.

TABLE 408.—*Butter, 92-score creamery: Average wholesale price, at five leading markets, by months, specified years*

Market and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
<b>New York:</b>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1910.....	33	30	33	31	28	28	28	29	30	30	31	30	30
1911.....	36	32	24	21	22	23	25	26	27	30	34	37	27
1912.....	39	32	31	33	30	27	27	27	30	31	34	37	32
1913.....	35	36	37	35	29	28	27	28	32	31	34	30	32
1914.....	33	29	28	25	26	27	28	30	31	32	35	34	30
1915.....	34	32	30	31	29	28	27	26	27	29	31	35	30
1916.....	33	34	37	36	31	30	29	31	34	35	39	40	31
1917.....	40	44	42	44	40	39	39	41	44	45	46	50	43
1918.....	52	50	44	42	42	44	45	46	56	58	63	69	51
1919.....	62	52	62	64	58	52	53	55	59	68	71	72	61
1920.....	65	66	67	71	61	57	57	55	59	60	63	55	61
1921.....	52	47	48	46	32	33	40	43	43	47	45	44	43
1922.....	37	37	38	38	38	37	36	35	41	46	51	54	41
1923.....	52	50	49	46	42	39	39	44	46	48	53	55	47
1924.....	53	50	47	38	39	41	40	38	38	39	43	45	43
1925.....	40	41	48	45	43	42	43	43	48	51	51	49	45
1926.....	45	45	43	39	41	41	40	42	45	47	51	55	44
1927.....	49	52	50	50	43	43	42	42	40	43	50	52	47
1928.....	49	47	49	45	45	44	45	47	49	48	51	50	47
1929.....	48	50	48	45	44	44	42	43	46	46	43	41	45
1930.....	37	36	37	30	35	33	35	39	40	40	36	32	37
1931.....	28	28	29	20	24	23	25	28	32	34	31	31	28
<b>Chicago:</b>													
1927.....	48	50	49	48	41	40	40	41	45	40	48	51	40
1928.....	47	46	48	44	43	43	44	40	47	46	49	49	46
1929.....	47	49	48	44	42	42	41	42	45	44	41	39	44
1930.....	35	35	37	37	34	32	35	38	38	38	34	31	35
1931.....	27	27	29	24	22	22	24	27	30	32	30	29	27
<b>San Francisco:</b>													
1927.....	47	48	45	42	41	42	42	44	47	48	40	48	45
1928.....	46	45	43	40	42	43	46	48	50	51	49	50	46
1929.....	46	47	45	43	45	45	45	46	49	48	48	42	46
1930.....	30	38	38	39	37	34	34	37	39	37	34	33	36
1931.....	26	28	28	24	25	25	26	30	31	32	32	30	28
<b>Philadelphia:</b>													
1927.....	50	52	51	51	44	43	43	43	47	49	51	53	48
1928.....	50	48	50	46	46	45	46	48	50	49	52	51	48
1929.....	49	51	49	46	45	45	43	44	47	47	44	42	46
1930.....	38	36	38	40	36	34	36	40	41	41	37	33	38
1931.....	30	29	30	27	25	24	26	29	34	35	32	32	29
<b>Boston:</b>													
1927.....	50	52	51	51	44	43	42	42	46	48	48	50	47
1928.....	49	47	50	46	45	44	45	47	49	48	50	50	48
1929.....	48	50	49	46	44	44	43	44	46	46	43	41	46
1930.....	37	36	38	39	35	33	36	39	40	40	36	33	37
1931.....	29	29	29	27	24	24	25	28	32	34	31	31	29

Bureau of Agricultural Economics. Compiled from Urner-Barry reports, 1910-1917 (New York), average of daily range; subsequently from reports of bureau representatives in the markets. Earlier data available in 1925 Yearbook, p. 1094, 1927 Yearbook, p. 1082, and 1931 Yearbook, p. 921.

TABLE 409.—*Butter: Average export price per pound in Copenhagen, Denmark, 1922-1931*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1922.....	31.1	31.0	32.9	33.8	33.5	37.0	39.4	39.1	41.1	40.7	39.9	39.7	36.6
1923.....	40.5	41.3	41.0	34.5	20.5	29.3	30.7	34.7	40.3	38.9	39.4	41.4	36.8
1924.....	40.0	39.5	36.9	31.3	36.4	33.4	37.8	41.1	42.3	46.1	44.2	46.8	39.6
1925.....	42.0	45.4	46.1	40.6	36.9	39.4	40.5	44.2	45.7	46.5	44.6	37.8	42.5
1926.....	36.5	40.2	38.8	36.2	34.8	35.7	35.4	36.1	36.6	36.3	34.9	37.1	36.6
1927.....	36.4	39.3	36.8	35.2	32.9	33.2	32.2	35.0	39.6	39.4	41.2	38.0	36.6
1928.....	35.4	37.5	40.0	36.8	35.4	34.9	36.4	38.0	40.2	39.5	40.6	42.4	38.1
1929.....	39.1	39.0	35.5	32.8	33.4	35.1	35.3	35.6	39.7	40.5	38.7	35.8	36.7
1930.....	32.0	35.3	31.7	27.4	26.3	27.7	30.3	29.2	29.9	30.1	27.2	27.3	29.5
1931.....	26.7	29.5	27.0	24.3	23.3	23.3	23.2	24.5	24.5	21.2	19.9	18.8	23.8

Bureau of Agricultural Economics. Danish Butter Journal (Smør Tidende) official quotations. For earlier years, 1882-1921, see the United States Department of Agriculture Yearbook, 1923, p. 923.

Conversions from Danish quotations January, 1922 to December, 1926, inclusive, from weekly quotations in kroner per 100 kg., at average monthly exchange rate as quoted by Federal Reserve Board. Beginning January, 1927, to date at par of exchange.

## DAIRY AND POULTRY STATISTICS

841

TABLE 410.—*Butter, creamery: Average wholesale<sup>1</sup> prices per pound, all scores, by months, New York and Chicago, 1931*

NEW YORK											
Month	93	92	91	90	89	88	87	86	Centralized car lots		
									90	89	88
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
January.....	29.50	28.50	28.16	27.63	27.20	26.44	25.90	-----	-----	-----	-----
February.....	29.35	28.40	27.90	27.35	26.04	25.95	25.23	-----	-----	-----	-----
March.....	29.58	28.88	28.47	28.11	27.38	26.54	26.06	-----	-----	-----	-----
April.....	27.09	26.10	25.85	25.63	25.36	25.02	24.78	-----	-----	-----	-----
May.....	24.70	23.70	23.34	22.97	22.27	21.81	21.28	-----	-----	-----	-----
June.....	24.33	23.33	22.90	22.32	21.60	20.95	20.45	-----	-----	-----	-----
July.....	25.95	24.95	24.50	23.70	23.05	22.22	21.64	-----	-----	-----	-----
August.....	26.11	25.12	24.66	23.99	23.18	22.41	21.60	-----	-----	-----	-----
September.....	33.50	32.50	31.52	29.00	27.67	26.94	26.24	-----	-----	-----	-----
October.....	34.76	33.76	32.61	30.19	28.44	27.85	27.13	-----	-----	-----	-----
November.....	31.93	30.93	30.34	29.60	28.92	28.32	27.64	-----	-----	-----	-----
December.....	31.55	30.55	29.85	28.48	26.90	25.92	25.19	-----	-----	-----	-----
Average.....	29.30	28.31	27.76	26.85	25.97	25.28	24.68	-----	-----	-----	-----

CHICAGO											
January.....	28.10	27.35	26.61	26.04	25.54	24.08	24.25	23.75	27.22	25.97	24.97
February.....	27.91	27.15	26.51	26.01	25.43	24.84	24.07	23.67	26.90	25.85	24.68
March.....	29.44	28.69	28.12	27.65	26.94	26.28	25.23	24.69	28.61	27.65	26.25
April.....	25.12	24.37	24.05	23.78	23.39	22.96	22.46	21.84	24.46	23.58	22.79
May.....	23.12	22.37	21.82	21.43	20.85	20.28	19.44	18.86	22.48	21.27	20.31
June.....	23.04	22.30	21.62	21.13	20.49	19.88	18.87	18.37	22.48	21.21	19.93
July.....	24.60	23.85	23.14	22.59	21.85	21.00	20.10	19.31	23.97	22.72	21.19
August.....	27.94	27.19	26.25	25.47	24.44	23.23	22.33	21.63	26.90	25.05	23.45
September.....	31.01	30.26	29.16	27.98	26.52	25.48	24.48	23.98	28.98	26.66	25.41
October.....	32.93	32.18	31.03	29.76	28.25	26.65	25.65	25.04	31.22	28.09	26.75
November.....	30.45	29.70	28.79	28.05	27.05	26.11	25.07	24.48	28.20	26.80	26.15
December.....	29.89	29.15	27.79	26.81	25.20	24.30	23.58	22.94	26.40	24.64	24.13
Average.....	27.80	27.05	26.24	25.56	24.67	23.83	22.96	22.37	26.49	24.97	23.83

<sup>\*</sup> Bureau of Agricultural Economics.<sup>1</sup> Principally sales by first-hand receivers to jobbers, chain stores, or other large distributors, in less-than carload lots, except as otherwise indicated.TABLE 411.—*Cheese, whole milk American Cheddar: Production in the United States, 1920-1930*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>
1920.....	10,457	11,509	14,954	18,856	20,832	41,376	34,313	26,787	22,935	20,054	13,308	10,303	254,684
1921.....	11,889	12,857	17,678	23,521	34,556	36,444	26,977	27,652	23,612	21,496	13,426	11,618	261,728
1922.....	12,837	13,927	18,774	21,740	31,349	30,284	33,265	20,496	25,581	25,785	18,382	15,416	282,808
1923.....	15,092	15,320	20,184	24,014	32,942	41,382	38,288	31,822	25,048	25,506	18,236	16,008	308,103
1924.....	17,718	18,880	22,955	24,697	33,657	43,517	40,716	33,602	30,539	26,210	17,552	15,048	324,696
1925.....	16,834	17,991	21,598	26,889	38,012	45,782	43,706	37,659	31,548	28,253	20,849	18,619	347,240
1926.....	19,519	19,984	25,216	20,221	38,598	46,320	40,164	33,239	28,800	23,164	16,886	15,295	335,915
1927.....	16,060	17,085	21,318	24,533	34,704	41,489	38,195	31,644	25,763	23,012	16,717	16,337	307,777
1928.....	18,010	19,005	23,451	28,221	37,324	45,012	40,072	34,229	30,342	25,134	18,013	16,440	335,253
1929.....	19,925	19,522	24,059	30,181	42,483	51,702	48,007	37,811	30,824	25,961	19,655	20,184	370,814
1930.....	23,666	23,031	28,502	34,143	48,545	53,887	45,582	33,555	26,705	23,581	18,781	18,838	378,816

Bureau of Agricultural Economics. The 1929 and 1930 statistics are the most complete since these reports were inaugurated in 1918. Some allowance, therefore, should be made for this when comparing 1929 and 1930 production with that of previous years.

TABLE 412.—*Cheese, whole-milk American Cheddar: Production, United States, by States, 1921-1930*

State	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>
Vermont.....	1,380	954	1,200	1,755	1,120	1,114	629	603	713	1,309
Other New England States.....	79	-----	-----	34	6	128	96	147	75	85
New England.....	1,459	954	1,200	1,759	1,126	1,242	725	750	788	1,494
New York.....	87,970	47,726	37,448	36,608	38,401	31,663	24,931	31,075	26,072	29,219
New Jersey.....	634	106	155	-----	-----	-----	-----	-----	-----	307
Pennsylvania.....	3,208	2,209	2,497	1,750	1,349	1,081	1,750	2,196	1,240	1,749
Middle Atlantic.....	41,178	50,569	40,141	38,513	39,760	33,344	26,081	33,271	27,312	31,275
Ohio.....	654	195	128	366	253	269	303	936	1,114	1,000
Indiana.....	117	62	78	306	198	234	701	4,969	8,903	11,243
Illinois.....	1,751	2,401	2,875	2,498	2,444	2,902	2,836	4,115	6,016	5,132
Michigan.....	5,064	3,657	4,342	5,867	5,844	6,827	5,906	7,721	8,019	6,476
Wisconsin.....	182,777	193,376	226,910	235,186	258,684	248,059	227,447	221,775	242,269	240,686
North Central, East.....	190,363	199,691	234,330	244,223	267,423	258,291	237,193	239,519	266,921	270,637
Minnesota.....	5,693	5,291	7,229	9,790	8,419	8,984	7,556	9,163	10,979	9,086
Iowa.....	313	344	361	530	501	383	410	601	991	804
Missouri.....	382	96	224	105	282	312	484	2,377	4,442	3,248
Others.....	141	190	186	354	477	912	1,301	4,073	0,571	7,481
North Central, West.....	6,529	5,921	8,000	10,779	9,649	10,591	9,751	17,174	22,983	20,709
South Atlantic.....	184	226	277	276	155	110	104	754	1,305	858
Tennessee.....	50	71	284	308	321	172	154	650	2,458	2,518
Others.....	20	-----	51	-----	37	-----	15	3,006	6,841	6,378
South Central, East.....	79	71	335	308	358	172	100	4,255	9,299	8,896
South Central, West.....	15	51	-----	37	-----	5	-----	1,433	3,329	4,203
Wyoming.....	1,543	3,416	1,701	1,883	1,923	2,118	2,067	2,185	2,231	2,519
Idaho.....	2,117	3,368	5,311	7,343	7,320	7,996	7,434	7,718	7,327	8,301
Utah.....	1,027	3,219	2,139	2,162	1,763	1,809	2,205	2,592	2,794	2,004
Montana.....	113	259	641	792	1,266	1,484	1,435	2,347	1,873	1,687
Others.....	529	187	318	701	482	650	1,390	3,101	3,111	2,944
Mountain.....	5,329	10,449	10,200	12,881	12,774	14,047	14,531	17,913	17,336	18,235
Washington.....	1,910	2,928	2,762	2,958	3,076	3,130	2,924	4,051	4,456	4,945
Oregon.....	8,777	8,720	7,678	9,951	9,903	11,517	11,435	11,051	12,590	14,727
California.....	5,904	3,226	3,082	2,850	3,026	3,460	4,204	5,052	3,915	2,947
Pacific.....	16,591	14,874	13,522	15,799	16,005	18,113	18,563	20,154	20,981	22,610
Total.....	261,727	282,406	308,014	324,695	347,240	335,916	307,777	336,263	370,314	378,816

Bureau of Agricultural Economics. The compilations are made from reports of factories to the bureau. The 1929 and 1930 statistics are the most complete since these reports were inaugurated in 1918. Some allowance, therefore, should be made for this when comparing 1929 and 1930 production with that of previous years.

TABLE 413.—*Cheese: Receipts, gross weight,<sup>1</sup> at five markets, by months, specified years*

Market and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>
New York:													
1929	3,725	3,854	4,066	3,095	4,576	5,218	5,588	5,074	4,534	3,858	3,502	3,821	50,911
1930	4,094	4,212	3,690	3,977	4,934	6,247	4,956	4,368	4,691	3,881	3,676	3,490	52,185
1931	4,183	3,887	4,395	3,889	4,315	7,099	5,083	5,261	4,645	5,409	4,207	3,712	56,005
Chicago:													
1929	7,262	7,134	5,511	5,619	7,972	8,257	9,048	8,542	6,641	6,053	4,585	4,199	80,823
1930	5,376	4,949	5,096	5,001	5,586	5,702	5,980	5,577	4,906	4,024	3,491	3,205	58,896
1931	4,163	3,067	3,656	3,396	3,220	3,898	4,380	4,155	3,007	3,307	2,932	2,356	41,555
Philadelphia:													
1929	1,290	1,198	1,190	1,402	1,957	1,616	2,265	1,788	2,023	2,105	1,840	1,171	10,973
1930	1,214	1,295	1,027	1,481	1,929	2,268	2,276	1,709	2,214	1,790	1,542	1,539	21,167
1931	1,307	1,538	1,639	1,564	1,935	2,530	1,707	2,225	1,791	2,045	1,334	1,334	20,949
Boston:													
1929	639	978	709	997	1,232	1,978	2,363	1,837	1,108	1,232	917	919	14,899
1930	922	1,189	1,111	1,220	1,330	2,097	1,894	1,764	1,042	1,542	1,178	993	16,882
1931	1,213	1,144	1,155	1,438	1,432	2,427	1,552	1,404	1,734	1,673	1,116	952	17,240
San Francisco:													
1929	935	713	785	1,018	1,013	1,337	1,284	1,866	983	1,105	985	769	12,293
1930	918	821	1,140	1,367	1,694	1,581	2,326	1,535	1,087	988	968	766	15,110
1931	784	750	872	1,158	1,243	1,526	1,468	1,201	871	1,154	980	950	12,907
Total:													
1921	11,498	11,283	12,758	13,952	19,361	21,680	19,324	15,999	14,923	16,653	13,229	10,973	181,622
1922	10,734	11,258	14,789	15,565	19,146	22,770	20,211	19,806	17,463	18,323	15,699	14,071	199,835
1923	13,063	12,617	15,354	16,433	18,963	25,406	25,764	21,680	18,619	21,325	16,557	13,256	219,037
1924	13,899	16,092	16,540	16,176	19,030	22,041	25,143	19,996	18,555	17,479	14,884	14,922	215,056
1925	15,202	12,845	14,898	15,430	18,529	24,025	25,825	24,176	20,520	21,029	17,059	14,012	223,556
1926	14,853	13,568	15,055	15,531	14,972	21,777	21,973	20,784	18,784	18,699	15,954	15,986	207,888
1927	12,707	14,916	14,956	16,922	21,301	22,134	24,134	22,556	21,522	18,906	14,278	13,826	218,248
1928	14,409	13,715	14,654	15,139	16,253	19,216	21,741	18,728	18,222	16,665	14,179	11,922	196,613
1929	13,781	12,877	13,261	12,331	16,750	18,406	20,548	18,605	15,289	14,343	11,829	10,879	178,890
1930	12,526	12,480	12,904	13,026	15,473	17,895	17,435	14,953	14,510	12,225	10,783	10,003	164,199
1931	11,600	10,406	11,717	11,445	12,145	17,480	14,190	14,264	11,948	13,588	10,569	9,304	148,666

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets. See 1927 Yearbook, p. 1084, and 1931 Yearbook, p. 924 for data for earlier years.

<sup>1</sup> Gross weight includes container and wrapping.

TABLE 414.—*Cheese, American, and all varieties: Cold-storage holdings,<sup>1</sup> United States, 1922-1931*AMERICAN<sup>2</sup>

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>
1922	27,691	21,430	15,006	10,745	10,868	15,481	33,130	46,880	53,625	49,473	40,852	37,291
1923	33,617	26,593	20,693	14,465	14,077	17,507	36,834	55,839	63,900	62,384	57,027	55,105
1924	40,566	40,506	35,160	28,294	26,202	27,172	45,239	65,864	76,406	73,153	67,905	58,705
1925	40,187	41,552	34,647	27,716	26,147	29,550	46,468	66,634	76,512	78,582	71,013	66,495
1926	55,457	50,339	42,587	38,041	35,897	39,346	54,069	73,681	81,297	77,046	72,491	63,891
1927	56,768	48,106	41,383	37,188	34,332	37,710	52,085	69,119	71,825	67,062	60,766	55,140
1928	40,014	43,837	38,169	33,294	32,177	39,203	56,896	75,862	86,632	84,745	85,126	77,258
1929	71,177	60,772	52,865	48,175	44,983	50,721	60,640	83,914	90,863	89,797	83,737	76,660
1930	68,930	58,972	53,208	40,507	43,239	53,403	74,986	95,773	95,063	90,162	83,074	75,736
1931	67,590	58,516	52,304	45,277	44,792	46,764	63,156	73,693	73,740	70,940	66,611	66,053

## ALL VARIETIES

1922	41,594	33,001	25,477	10,339	18,980	24,070	43,542	57,703	66,875	62,923	53,815	48,620
1923	45,234	37,228	29,516	21,815	21,192	26,235	48,728	70,860	80,663	78,791	74,302	72,623
1924	67,221	57,232	50,388	42,413	40,235	42,644	61,755	84,073	95,211	91,232	88,043	77,594
1925	67,558	58,401	50,117	40,480	39,037	42,888	61,992	83,568	95,472	97,777	90,866	84,561
1926	76,649	67,531	58,175	51,285	47,450	52,107	68,771	90,053	98,473	95,355	89,735	81,064
1927	74,217	64,216	56,073	49,835	47,461	52,748	69,302	89,965	92,280	87,080	79,334	72,428
1928	66,184	57,906	50,263	44,710	43,761	51,477	71,353	92,482	104,224	101,251	100,229	92,908
1929	88,832	77,024	67,087	61,223	57,569	64,177	83,627	107,110	110,314	107,831	100,588	92,553
1930	86,075	74,523	67,281	59,928	56,940	72,358	95,221	113,923	112,061	108,767	101,149	91,775
1931	83,288	73,488	66,177	57,711	57,422	60,242	77,989	89,264	91,284	83,564	87,386	84,035

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments. Changes in these tables made due to transference of current trading stocks to cold storage stocks from January 1, 1927, to December 1, 1931.

<sup>1</sup> Quantities given are net weight.

<sup>2</sup> The term "American cheese" is intended to cover only those varieties known as twins, flats, daistes, Cheddars, longhorns, and square prints. It does not, therefore, include all kinds of cheese made in America.

TABLE 415.—*Cheese: Receipts, gross weight,<sup>1</sup> at five markets, by State of origin, 1927-1931*

Market and origin	1927	1928	1929	1930	1931	Market and origin	1927	1928	1929	1930	1931
<b>NEW YORK</b>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<b>PHILADELPHIA—con.</b>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>
Ill.....	7,231	5,132	4,497	6,145	7,288	Pa.....	41	4	57	91	87
Ind.....	3,833	1,923	1,685	1,084	1,539	Wis.....	12,723	14,735	13,825	15,066	15,915
Iowa.....	421	178	82	84	26	Other States.....	26	196	41	60	237
Mass.....	189	64	365	93	68	Canada.....	126	166	75	-----	-----
Mich.....	440	837	937	844	704	<b>Total</b>	<b>20,396</b>	<b>21,039</b>	<b>19,073</b>	<b>21,167</b>	<b>20,949</b>
Minn.....	279	179	188	329	266	<b>CHICAGO</b>					
Mo.....	287	123	7	13	30	Calif.....	3	45	56	37	45
Nebr.....	150	42	52	45	115	Colo.....	31	58	197	22	12
N. J.....	204	186	69	89	8	Ill.....	2,996	2,900	1,994	1,853	943
N. Y.....	11,867	13,390	11,252	10,866	8,294	Ind.....	43	285	206	396	139
Ohio.....	587	646	678	617	576	Iowa.....	263	296	278	98	76
Pa.....	434	745	588	466	146	Kans.....	26	36	35	39	27
Vt.....	3	16	33	43	( <sup>2</sup> )	Mich.....	550	137	192	240	49
Va.....	3	24	220	1	( <sup>2</sup> )	Minn.....	2,503	2,079	2,999	1,751	1,132
Wis.....	19,268	23,002	27,068	28,835	35,456	Mo.....	122	583	181	24	20
Other States.....	280	248	372	204	78	Mont.....	66	445	780	319	879
Canada.....	1,471	1,537	2,918	2,427	1,411	N. Y.....	41	780	4,652	2,867	1,423
<b>Total</b>	<b>46,937</b>	<b>48,272</b>	<b>50,911</b>	<b>52,165</b>	<b>56,005</b>	Pa.....	3,489	4,246	4,652	3,116	1,423
<b>BOSTON</b>						Ohio.....	532	176	111	136	9
Ill.....	3,261	1,945	1,754	1,387	1,404	Pa.....	532	479	230	60	23
Ind.....	170	388	161	382	348	S. Dak.....	138	9	20	16	28
Mo.....	143	147	1	( <sup>2</sup> )	( <sup>2</sup> )	Tex.....	12	15	6	5	59
Mass.....	41	65	37	38	25	Wis.....	109,504	82,954	67,495	49,447	36,424
Mich.....	200	422	322	132	398	Other States.....	1,010	1,084	685	693	333
N. H.....	2	2	1	5	1	Canada.....	1,742	567	600	867	33
N. Y.....	2,831	3,787	2,847	2,349	2,310	<b>Total</b>	<b>123,633</b>	<b>97,264</b>	<b>80,823</b>	<b>58,806</b>	<b>41,555</b>
Ohio.....	196	110	6	12	70	<b>SAN FRANCISCO</b>					
Pa.....	197	56	10	60	1	Calif.....	2,515	3,508	3,449	4,213	3,110
Vt.....	124	47	34	113	54	Colo.....	241	225	179	165	129
Wis.....	7,170	9,963	9,260	8,492	11,746	Idaho.....	3,331	3,334	3,303	3,113	2,907
Other States.....	221	353	407	2,910	876	Ill.....	192	91	3	221	( <sup>2</sup> )
Canada.....	32	157	59	2	3	Mont.....	1	160	3	1	-----
<b>Total</b>	<b>14,588</b>	<b>17,362</b>	<b>14,899</b>	<b>16,882</b>	<b>17,240</b>	N. Y.....	596	572	734	784	637
<b>PHILADELPHIA</b>						Oreg.....	3,273	2,877	3,374	5,427	5,033
Ill.....	3,704	2,701	3,075	2,091	1,880	Utah.....	199	30	59	28	-----
Ind.....	115	110	137	84	146	Wash.....	91	17	17	13	34
Iowa.....	3	2	4	4	3	Wis.....	2,198	1,820	1,136	759	904
Mich.....	634	499	539	655	668	Other States.....	57	42	36	95	43
Minn.....	416	343	23	34	285	<b>Total</b>	<b>12,694</b>	<b>12,676</b>	<b>12,203</b>	<b>15,119</b>	<b>12,907</b>
N. Y.....	2,462	2,201	2,145	2,231	1,688						
Ohio.....	86	82	52	1	10						

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets.

<sup>1</sup> Gross weight includes container and wrapping.

<sup>2</sup> Not over 500 pounds.

TABLE 416.—*Cheese, No. 1 American, fresh single daisies: Average wholesale price per pound, New York, by months, 1924-1931*

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1924.....	24	24	23	20	19	20	20	21	21	21	21	22	21
1925.....	24	24	24	24	24	24	24	24	24	25	1 25	25	24
1926.....	26	25	23	21	21	21	22	22	23	24	25	20	23
1927.....	26	26	25	24	24	24	24	25	27	28	27	29	26
1928.....	25	1 23	25	24	24	26	26	26	27	26	25	25	1 25
1929.....	25	24	24	24	23	23	23	23	24	24	24	23	24
1930.....	21	21	21	21	20	18	18	19	20	19	19	18	20
1931.....	17	16	16	15	14	14	15	16	17	16	15	14	15

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the market. These wholesale prices are based upon open market sales made for cash or short-time credit, consideration being given to the prices at which the larger quantities are sold.

<sup>1</sup> Less than 10 quotations during month.

<sup>2</sup> Based on 11 months' quotations.

TABLE 417.—Cheese: International trade, average 1925-1929, annual 1927-1930

Country	Calendar year									
	Average 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports
<b>PRINCIPAL EXPORTING COUNTRIES</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
Netherlands.....	108,043	1,292	214,565	1,284	202,999	1,484	211,234	1,445	206,735	1,509
New Zealand.....	171,975	4,167	193	7,175	534	1	199,258	6,203	654	6
Canada.....	120,606	3,419	110,533	1,721	114,152	1,779	92,946	2,104	80,164	1,788
Italy.....	76,304	9,818	70,078	13,123	80,406	10,206	71,802	13,975	80,974	12,562
Switzerland.....	64,236	3,538	75,059	3,638	62,995	3,396	69,726	3,437	66,143	4,238
Denmark.....	14,740	971	11,644	1,102	13,417	863	14,513	647	12,626	810
Czechoslovakia.....	7,843	2,450	8,463	2,534	7,922	2,625	7,052	3,348	8,276	2,963
Australia <sup>2</sup> .....	6,724	1,212	4,813	2,097	9,262	1,007	5,131	548	-----	-----
Finland.....	5,951	42	6,502	34	3,634	39	4,836	44	4,682	-----
Yugoslavia.....	4,787	318	5,326	389	4,132	325	4,937	370	4,583	297
Bulgaria.....	2,150	18	5,790	19	1,932	15	2,642	11	2,465	-----
Hungary.....	1,870	1,720	2,609	1,733	1,398	1,782	1,703	1,536	1,846	945
Russia <sup>3</sup> .....	3,645	1,184	1,847	133	-----	-----	-----	-----	-----	-----
<b>Total.....</b>	<b>675,874</b>	<b>24,986</b>	<b>684,922</b>	<b>27,814</b>	<b>677,543</b>	<b>23,522</b>	<b>685,780</b>	<b>27,471</b>	<b>671,548</b>	<b>25,118</b>
<b>PRINCIPAL IMPORTING COUNTRIES</b>										
United Kingdom.....	4,509	331,101	5,363	325,891	5,852	333,182	6,388	331,744	5,579	345,227
Germany.....	3,311	149,025	3,160	163,740	3,094	135,530	4,919	145,809	5,411	137,458
United States.....	4,380	75,680	3,410	79,796	2,600	81,403	2,645	76,582	1,964	68,311
Belgium.....	1,174	38,720	1,001	36,538	914	39,145	890	40,455	870	51,106
France.....	22,557	38,671	25,595	36,856	35,122	36,694	40,608	51,070	38,021	65,623
Algeria.....	220	7,601	210	6,949	185	8,321	193	8,474	212	10,398
Spain.....	59	7,109	72	7,576	91	8,667	67	6,970	207	5,835
Austria.....	1,769	7,056	1,357	7,553	2,401	6,401	2,936	5,716	4,494	5,636
Egypt.....	182	6,870	176	6,740	155	7,085	195	6,526	121	7,494
Cuba.....	5	4,764	3	5,210	12	4,163	6	4,484	10	2,867
Greece.....	40	3,942	4	9,735	21	2,298	178	3,314	-----	2,301
Argentina.....	862	3,681	1,224	3,228	764	4,344	796	4,000	744	3,777
Irish Free State.....	271	2,567	212	2,414	133	2,449	123	2,409	-----	2,350
Dutch East Indies.....	0	1,881	0	1,997	0	1,938	0	2,346	0	2,161
Mexico.....	124	1,808	130	1,548	125	1,714	-----	1,744	-----	1,230
Brazil.....	0	1,472	0	1,395	0	1,763	0	1,555	0	1,245
Sweden.....	474	1,405	574	1,522	145	1,501	263	1,413	550	1,473
Tunis.....	21	1,347	14	1,313	46	1,430	13	1,083	28	1,704
British India.....	6	1,231	4	1,332	6	1,218	7	1,257	7	1,148
Norway.....	925	1,191	894	1,452	927	1,094	1,347	841	1,380	749
Union of South Africa.....	342	530	431	537	298	734	404	660	1,964	450
<b>Total.....</b>	<b>51,201</b>	<b>687,552</b>	<b>43,885</b>	<b>698,222</b>	<b>53,521</b>	<b>681,577</b>	<b>61,987</b>	<b>705,621</b>	<b>62,157</b>	<b>718,504</b>

Bureau of Agricultural Economics. Official sources except where otherwise noted. All cheese made from milk, including "cottage cheese."

<sup>1</sup> Preliminary.

<sup>2</sup> International Yearbook of Agricultural Statistics.

<sup>3</sup> 3-year average.

<sup>4</sup> 4-year average.

TABLE 418.—Oleomargarine, standard, uncolored: Average wholesale price per pound, Chicago, by months, 1922-1931<sup>1</sup>

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1922.....	10.0	17.5	17.5	17.5	17.5	17.5	18.2	18.5	18.5	18.5	19.2	20.5	18.3
1923.....	20.0	20.5	20.5	20.5	20.5	20.5	20.5	20.5	21.0	21.5	22.2	22.5	20.9
1924.....	22.5	22.5	21.9	20.5	20.5	20.5	21.2	22.5	22.5	23.0	24.0	24.5	22.2
1925.....	24.5	24.5	24.5	24.5	23.9	23.5	23.7	24.5	24.5	24.5	24.5	24.5	24.3
1926.....	24.5	24.3	23.5	23.3	22.5	22.5	22.5	22.5	23.5	23.5	21.8	21.5	22.8
1927.....	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	23.9	24.5	23.5	23.5	22.3
1928.....	23.5	23.5	23.5	21.5	21.5	21.5	21.5	21.5	22.0	23.5	23.5	23.5	22.5
1929.....	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5	23.5
1930.....	23.5	23.5	23.5	23.5	23.5	22.5	20.5	20.5	20.5	20.5	19.0	19.0	21.8
1931.....	17.7	15.5	14.5	14.5	12.8	11.0	10.6	10.5	11.9	12.7	13.8	13.4	13.3

Bureau of Agricultural Economics. Compiled from Bureau of Labor Statistics Wholesale Price Bulletins.

<sup>1</sup> These prices are for consignment to the wholesale trade.

TABLE 419.—*Oleomargarine: Materials used in manufacture, 1921-22 to 1930-31*

Material	Year beginning July—									
	1921-22	1922-23	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Butter.....	1,107	1,576	1,900	1,509	2,330	2,070	2,484	2,611	2,616	1,013
Coconut oil.....	57,304	65,656	83,059	79,449	98,307	107,654	141,000	171,412	185,066	156,954
Coloring.....	11	11	26	38	41	18	19	47	21	11
Corn oil.....			457	196	174	183	38		( <sup>1</sup> )	159
Cottonseed oil.....	15,420	18,757	20,640	20,960	25,608	23,372	24,801	28,173	30,214	22,037
Edible tallow.....			24	111	93	219	70	26	16	( <sup>1</sup> )
Milk.....	53,939	59,835	69,090	61,924	72,662	73,700	83,115	94,752	97,753	77,251
Mustard-seed oil.....			38	27	34	53	56	12	48	48
Neutral lard.....	27,057	29,568	32,210	25,674	25,172	24,872	25,036	24,189	10,632	10,180
Oleo oil.....	40,980	46,645	52,265	44,102	47,418	48,741	45,477	47,185	45,322	28,040
Oleo stearine.....	4,574	4,815	5,317	5,250	5,314	5,145	5,532	5,834	6,269	5,485
Oleo stock.....	2,143	2,322	2,756	3,183	3,082	2,552	1,738	1,204	1,149	1,025
Peanut oil.....	11,625	6,922	5,656	4,392	5,287	4,872	5,459	6,617	5,714	5,201
Salt.....	16,262	17,998	20,593	18,725	20,593	21,683	25,024	27,311	28,890	22,981
Soybean oil.....					1	33			619	2,262
Miscellaneous.....	3,417	2,918	432	688	1,374	918	1,220	1,474	1,279	3,154
Total.....	233,929	257,023	294,463	266,234	307,460	316,085	361,069	410,937	424,648	334,801

Bureau of Agricultural Economics. Compiled from annual reports of the Bureau of Internal Revenue.

<sup>1</sup> Not over 500 pounds.TABLE 420.—*Oleomargarine: Production and apparent consumption in the United States, 1924-25 to 1930-31*

Year beginning July—	Production			Stocks begin- ning of year	Exports	Stocks end of year	Apparent con- sumption	
	Colored	Uncol- ored	Total				Total	Per capita
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	Pounds
1924-25.....	11,280	204,123	215,403	2,607	887	2,720	214,403	1.87
1925-26.....	13,181	234,866	248,047	2,720	1,256	2,942	246,569	2.12
1926-27.....	14,502	242,555	257,157	2,942	942	3,299	255,858	2.17
1927-28.....	15,351	279,348	294,699	3,299	732	3,187	294,079	2.46
1928-29.....	16,306	316,816	333,122	3,187	633	4,191	331,485	2.74
1929-30.....	17,103	332,021	349,124	4,191	931	4,702	347,682	2.84
1930-31.....	8,847	268,926	277,773	4,694	604	2,494	279,369	2.20

Bureau of Agricultural Economics. Production and stocks from reports of the Bureau of Internal Revenue. Exports from reports of the Bureau of Foreign and Domestic Commerce. See 1927 Yearbook, p.1088, for data for earlier years.

TABLE 421.—*Chickens: Number on hand, January 1 and value in the United States, 1920-1931*

Year	Chickens on hand Jan. 1			Year	Chickens on hand Jan. 1		
	Number of fowls	Price per head	Total value		Number of fowls	Price per head	Total value
	Thou- sands	Cents	1,000 dollars		Thou- sands	Cents	1,000 dollars
1920 (census).....	859,537	97.21	349,509	1926.....	424,227	83.61	375,900
1921.....	358,168	89.30	318,058	1927.....	448,665	91.07	408,619
1922.....	396,507	80.77	320,259	1928.....	463,364	86.07	398,838
1923.....	411,469	74.61	306,998	1929.....	444,481	91.30	406,798
1924.....	449,188	76.09	341,765	1930.....	470,463	93.15	438,220
1925.....	417,755	79.20	330,871	1931.....	459,402	70.49	323,849

Bureau of Agricultural Economics.

TABLE 422.—*Chickens: Estimated number and value per head on farms January 1, 1925-1931*

State and division	Number chickens Jan. 1							Value per head						
	1925	1926	1927	1928	1929	1930	1931	1925	1926	1927	1928	1929	1930	1931
	<i>Thous- ands</i>	<i>Thous- ands</i>	<i>Thous- ands</i>	<i>Thous- ands</i>	<i>Thous- ands</i>	<i>Thous- ands</i>	<i>Thous- ands</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
Maine.....	1,957	1,957	1,898	2,020	1,998	2,051	2,159	125	132	132	136	140	155	126
New Hampshire.....	1,267	1,267	1,242	1,336	1,271	1,381	1,265	140	148	148	150	150	160	130
Vermont.....	1,970	1,970	1,999	1,040	1,078	1,095	1,064	123	130	132	130	130	140	115
Massachusetts.....	2,030	2,030	1,949	2,027	1,991	2,132	2,085	160	165	165	160	160	170	140
Rhode Island.....	981	981	1,883	2,412	1,391	2,416	382	160	170	160	160	157	175	135
Connecticut.....	1,690	1,784	1,820	2,069	2,221	2,221	2,197	145	155	150	155	155	165	120
New York.....	13,945	14,224	14,386	13,980	14,621	14,688	14,688	112	121	120	117	123	126	103
New Jersey.....	4,196	4,322	4,688	4,674	4,628	5,115	4,496	140	149	146	130	145	148	126
Pennsylvania.....	17,662	18,181	19,111	19,875	19,094	20,818	20,315	108	115	115	114	121	128	98
North Atlantic.....	44,077	44,817	46,164	47,711	46,240	49,870	48,617	118.16	126.45	126.12	122.80	129.27	135.58	107.51
Ohio.....	21,345	22,643	23,549	23,887	23,185	24,954	24,878	89	100	100	93	97	101	75
Indiana.....	17,710	17,348	18,310	17,821	17,331	18,735	18,013	82	94	95	89	95	97	71
Illinois.....	26,992	26,514	27,575	27,479	27,148	28,738	26,824	85	96	96	91	101	101	73
Michigan.....	12,956	13,805	14,422	15,143	14,503	14,952	14,967	90	98	98	92	103	105	81
Wisconsin.....	13,268	13,314	14,019	14,769	14,467	15,322	15,877	80	88	91	88	95	97	72
North Central, East.....	91,289	93,932	98,775	99,129	99,694	102,721	100,569	85.33	95.42	96.30	90.33	98.36	100.26	74.17
Minnesota.....	16,736	17,087	17,376	16,789	17,411	18,627	17,738	70	77	80	73	79	80	63
Iowa.....	30,272	31,183	31,806	32,340	32,005	34,713	34,050	78	89	89	84	90	95	66
Missouri.....	28,796	28,937	31,733	30,733	30,603	32,308	30,408	70	81	85	85	88	98	60
North Dakota.....	6,233	6,442	6,253	5,158	5,322	5,669	5,389	68	70	71	71	77	77	52
South Dakota.....	7,082	8,065	8,226	8,472	9,087	9,087	8,923	62	73	82	74	83	74	57
Nebraska.....	13,632	13,030	13,613	13,757	14,471	14,803	14,773	68	74	80	75	84	78	57
Kansas.....	21,826	21,389	22,080	22,372	22,409	23,596	23,139	63	77	83	75	81	90	54
North Central, West.....	124,475	126,193	129,947	130,628	129,663	138,803	134,465	68.39	80.05	83.94	79.14	84.88	81.63	60.03
North Central.....	215,761	220,125	228,722	229,767	229,327	241,594	235,024	75.56	86.61	89.28	84.18	91.59	89.55	66.08
Delaware.....	1,392	1,392	1,434	1,462	1,389	1,492	1,454	100	115	120	105	109	115	90
Maryland.....	4,324	4,454	4,721	4,763	4,511	4,728	4,728	95	113	112	100	104	112	90
Virginia.....	9,406	9,594	10,361	10,896	9,870	10,543	10,214	83	90	92	91	95	99	72
West Virginia.....	4,436	4,569	4,643	4,747	4,643	4,876	4,705	85	90	92	90	92	92	71
North Carolina.....	8,430	8,900	9,345	8,675	8,769	8,675	8,634	73	80	81	81	82	87	70
South Carolina.....	4,365	4,103	4,513	4,827	4,138	4,159	4,167	73	73	73	73	72	77	71

TABLE 422.—*Chickens: Estimated number and value per head on farms January 1, 1925-1931—Continued*

State and division	Number chickens Jan. 1										Value per head				
	1925	1926	1927	1928	1929	1930	1931	1925	1926	1927	1928	1929	1930	1931	
	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Cents	Cents	Cents	Cents	Cents	Cents	Cents	
Georgia.....	7,080	7,080	7,032	6,245	7,084	7,283	7,355	75	74	76	71	72	76	64	
Florida.....	2,194	2,150	2,448	2,667	2,294	2,580	2,559	95	103	100	85	87	88	85	
South Atlantic.....	42,271	42,095	46,028	47,722	42,838	44,380	43,827	81.95	88.10	89.02	84.50	86.96	91.49	78.37	
Kentucky.....	11,257	11,493	12,401	12,639	11,063	11,790	11,089	69	74	80	77	82	88	90	
Tennessee.....	12,217	12,394	13,339	14,166	12,712	12,821	12,077	68	72	77	73	75	81	67	
Alabama.....	6,473	6,472	6,862	7,060	6,237	6,655	6,601	65	67	70	67	70	76	54	
Mississippi.....	6,135	6,403	7,023	7,171	6,184	6,909	6,590	70	70	71	70	72	80	57	
Arkansas.....	7,522	7,398	8,530	8,871	8,401	8,748	8,988	58	67	67	62	68	70	47	
Louisiana.....	4,063	4,068	4,724	4,289	4,267	4,678	4,380	67	77	76	77	81	85	63	
Oklahoma.....	13,263	13,026	15,107	15,581	15,457	15,833	14,633	63	74	80	73	78	75	54	
Texas.....	20,136	18,925	21,159	24,124	22,673	23,574	23,576	64	69	72	67	67	73	56	
South Central.....	81,066	81,155	89,125	98,801	87,434	91,028	85,914	65.26	71.29	74.72	70.45	73.38	77.49	55.86	
Montana.....	2,545	2,595	2,465	2,676	2,863	2,713	2,690	70	71	80	83	84	80	60	
Idaho.....	2,000	2,194	2,414	2,562	2,728	2,662	2,759	61	70	75	73	79	84	62	
Wyoming.....	809	768	828	953	980	971	948	70	73	80	80	82	88	68	
Colorado.....	3,732	3,902	4,214	4,288	4,502	4,872	4,722	68	73	78	74	75	79	63	
New Mexico.....	965	888	977	1,119	1,101	1,156	1,123	67	75	81	74	76	77	62	
Arizona.....	655	564	564	676	676	676	712	90	100	95	95	100	105	86	
Utah.....	1,405	1,405	1,642	1,805	1,940	2,412	2,849	66	76	75	75	81	87	70	
Nevada.....	294	291	371	288	288	291	281	77	90	90	95	100	110	90	
Washington.....	5,577	6,234	7,054	8,313	7,572	8,037	8,751	80	95	105	90	95	99	90	
Oregon.....	3,326	3,632	4,231	4,049	4,049	4,903	4,073	95	94	95	91	94	94	80	
California.....	13,168	13,826	15,209	17,342	15,260	16,018	17,067	98	110	120	103	109	114	95	
Far Western.....	34,557	35,635	39,631	44,373	41,897	43,711	43,020	81.73	88.38	100.89	91.11	94.73	98.85	78.50	
United States.....	417,755	424,227	445,085	463,364	444,481	470,468	459,402	79.20	88.61	91.07	86.07	91.80	98.15	70.49	

Bureau of Agricultural Economics.

## DAIRY AND POULTRY STATISTICS

849

TABLE 423.—*Eggs: Annual layings per flock on farms of crop correspondents, by States, 1925-1931*<sup>1</sup>

State and division	1925	1926	1927	1928	1929	1930	1931
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Maine.....	8,518	8,317	8,287	8,567	8,685	8,868	9,868
New Hampshire.....	9,479	7,944	8,594	9,248	9,290	9,077	9,494
Vermont.....	6,272	6,293	6,344	6,786	6,685	7,384	7,865
Massachusetts.....	9,384	10,180	9,436	11,004	10,707	11,634	11,911
Rhode Island.....	10,534	10,108	10,588	11,215	9,536	11,856	11,987
Connecticut.....	8,740	9,819	10,749	10,965	11,345	11,643	12,360
New York.....	10,117	10,065	10,512	10,404	11,078	11,050	11,364
New Jersey.....	11,889	12,193	12,291	12,017	12,294	12,349	13,075
Pennsylvania.....	11,408	12,114	12,619	12,209	12,589	12,920	13,346
North Atlantic.....	10,283	10,543	10,946	10,880	11,253	11,567	11,951
Ohio.....	11,987	12,656	13,221	12,770	12,890	13,701	13,911
Indiana.....	12,102	12,537	12,938	12,596	12,643	12,756	13,029
Illinois.....	11,734	12,230	12,470	12,044	12,099	12,333	12,481
Michigan.....	8,959	9,594	10,084	10,251	10,008	10,345	10,841
Wisconsin.....	9,004	9,631	10,163	10,477	10,777	11,455	12,078
Minnesota.....	10,251	10,245	10,251	10,352	10,679	11,391	11,683
Iowa.....	13,431	14,683	14,689	14,792	14,632	15,382	14,850
Missouri.....	13,005	14,285	14,489	13,932	13,510	14,075	14,279
North Dakota.....	7,652	7,889	7,448	7,570	7,820	7,348	7,430
South Dakota.....	10,379	10,704	10,798	11,328	11,470	12,382	11,972
Nebraska.....	10,769	11,473	11,412	11,736	11,737	12,750	12,576
Kansas.....	14,160	14,917	15,218	15,223	15,249	15,559	16,212
North Central.....	11,462	12,141	12,379	12,303	12,284	12,822	13,021
Delaware.....	16,696	17,568	19,660	19,615	16,541	14,004	13,093
Maryland.....	11,692	12,637	13,659	12,349	12,795	12,066	11,984
Virginia.....	7,977	8,287	9,032	8,506	8,442	8,254	8,594
West Virginia.....	8,576	8,682	8,801	8,882	8,190	8,579	8,480
North Carolina.....	5,782	5,819	6,373	6,314	5,580	5,208	5,512
South Carolina.....	4,976	5,338	5,840	5,612	5,083	5,241	5,398
Georgia.....	5,432	5,399	5,530	5,484	4,894	4,776	4,709
Florida.....	7,372	7,640	8,023	7,247	7,320	6,901	7,162
South Atlantic.....	6,678	6,894	7,334	7,113	6,618	6,480	6,504
Kentucky.....	6,843	7,408	8,311	6,945	6,424	6,785	6,740
Tennessee.....	6,645	7,199	8,035	7,192	6,618	6,706	6,624
Alabama.....	5,569	5,797	6,120	5,402	5,521	5,457	5,533
Mississippi.....	5,281	6,095	6,110	5,673	5,182	5,019	5,016
Arkansas.....	5,578	6,098	6,454	6,216	5,983	5,642	5,600
Louisiana.....	6,576	6,968	6,764	6,396	5,992	6,004	5,706
Oklahoma.....	9,576	10,962	11,841	11,001	10,959	10,698	10,242
Texas.....	7,336	7,940	9,345	9,611	9,485	9,196	9,488
South Central.....	6,742	7,388	8,056	7,529	7,234	7,203	7,127
Montana.....	6,822	7,190	6,506	7,549	7,247	7,311	7,253
Idaho.....	8,378	9,840	10,087	11,218	10,886	9,986	10,050
Wyoming.....	7,260	7,968	7,554	8,391	7,764	8,439	8,202
Colorado.....	8,235	8,913	8,552	9,510	9,752	9,546	9,844
New Mexico.....	6,235	6,731	7,314	7,762	7,694	7,177	7,944
Arizona.....	9,483	9,734	9,764	8,903	9,020	9,333	10,087
Utah.....	7,849	8,983	9,245	10,080	10,226	11,423	11,546
Nevada.....	7,737	10,482	9,339	11,926	13,051	10,318	11,342
Washington.....	9,965	9,968	10,996	10,266	10,607	10,883	11,218
Oregon.....	9,153	9,059	10,281	10,522	10,579	10,005	10,281
California.....	8,925	9,500	9,884	9,507	8,293	8,795	9,990
Western.....	8,481	9,050	9,362	9,593	9,335	9,223	9,814
United States.....	8,850	9,401	9,827	9,608	9,440	9,620	9,655

Bureau of Agricultural Economics.

<sup>1</sup> Calculated by multiplying average daily layings per flock by the number of days in the year. Daily production derived from number of eggs laid on the first day of each month, as reported for about 23,000 farm flocks.

TABLE 424.—Poultry, live: Freight receipts, by States, at New York, 1927-1931

State	1927	1928	1929	1930	1931	State	1927	1928	1929	1930	1931
	Cars	Cars	Cars	Cars	Cars		Cars	Cars	Cars	Cars	Cars
Alabama.....	82	176	181	129	186	New Jersey.....	1	1	13	1	2
Arkansas.....	420	410	369	349	359	New Mexico.....	1	1	1	1	1
Colorado.....	52	89	86	82	24	New York.....	91	158	240	107	63
Delaware.....	—	—	—	—	—	North Carolina.....	—	33	67	55	78
Florida.....	—	—	2	4	3	North Dakota.....	—	—	—	—	—
Georgia.....	45	151	179	79	62	Ohio.....	429	343	335	305	335
Illinois.....	1,227	874	880	1,174	975	Oklahoma.....	808	873	835	763	728
Indiana.....	1,267	842	903	1,168	942	Pennsylvania.....	58	30	44	12	8
Iowa.....	856	586	354	604	732	South Carolina.....	29	41	125	40	50
Kansas.....	601	474	422	509	447	South Dakota.....	187	313	273	214	300
Kentucky.....	739	741	397	511	593	Tennessee.....	975	1,060	884	642	857
Louisiana.....	1	1	—	—	—	Texas.....	365	430	348	332	233
Maryland.....	—	—	—	2	1	Utah.....	—	—	—	—	—
Massachusetts.....	1	1	—	—	—	Virginia.....	56	68	50	91	96
Michigan.....	1	6	6	—	—	Wisconsin.....	253	219	175	188	192
Minnesota.....	166	164	121	122	187	Wyoming.....	2	5	13	4	1
Mississippi.....	154	188	90	76	75	Other States.....	34	—	—	—	—
Missouri.....	2,147	1,896	1,874	2,019	1,650						
Nebraska.....	996	1,078	1,156	1,082	985	United States.....	12,104	11,267	10,493	10,677	10,152

Bureau of Agricultural Economics.

TABLE 425.—Poultry, dressed: Receipts, gross weight,<sup>1</sup> at four markets, by months, 1927-1931; totals, 1921-1931

Market and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Boston:	1,000	1,000	1,000	1,000	1,600	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
1927..	4,318	3,610	2,440	2,398	3,653	3,455	2,906	3,612	3,404	4,663	8,511	10,245	53,305
1928..	4,591	3,756	4,137	2,877	3,285	3,290	3,899	3,468	3,555	4,680	7,716	10,320	55,583
1929..	4,586	3,231	2,315	2,855	2,718	3,369	3,153	3,028	4,309	6,048	8,826	10,395	54,433
1930..	4,270	3,992	2,815	2,544	3,193	3,514	3,401	2,952	3,154	3,875	8,270	9,309	51,289
1931..	4,840	4,565	3,846	2,976	2,559	3,216	3,476	3,635	3,787	4,434	9,698	10,750	57,782
New York:	12,954	8,957	8,722	7,770	11,633	13,635	12,168	14,589	15,470	17,682	31,740	32,797	188,117
1927..	14,999	11,064	9,322	9,703	10,628	11,127	13,252	13,850	14,332	21,799	31,846	32,454	194,376
1928..	14,221	10,900	9,004	9,520	10,233	11,876	13,078	15,707	16,588	20,602	31,495	32,903	197,057
1929..	15,054	11,674	8,476	10,630	13,877	14,999	11,807	12,533	15,383	19,647	32,584	34,221	200,885
1930..	17,969	13,396	9,920	10,073	10,553	13,657	15,242	18,294	21,147	18,740	33,029	36,882	218,911
Philadelphia:	2,885	2,006	2,005	1,769	1,095	1,668	1,398	1,918	2,530	2,613	4,432	6,003	31,822
1927..	2,373	1,001	1,885	1,359	1,558	2,177	1,931	1,763	2,007	2,905	4,925	7,210	31,844
1928..	2,548	1,851	1,680	1,471	1,557	1,663	2,134	2,319	2,302	2,542	6,002	8,505	34,064
1929..	3,041	2,501	2,207	1,991	2,388	2,117	1,704	1,772	2,166	3,046	5,607	7,906	36,536
1930..	2,384	2,179	2,863	1,754	1,560	2,509	2,720	2,875	2,555	2,524	6,018	8,243	36,103
Chicago:	6,495	3,546	2,195	1,835	2,872	2,257	1,227	2,257	2,531	3,752	15,739	10,020	63,735
1927..	6,639	3,591	2,216	1,876	2,137	1,977	2,771	2,829	3,580	6,710	15,301	18,544	67,180
1928..	7,712	3,469	2,707	2,725	2,811	3,270	3,520	3,884	4,710	9,079	25,578	23,812	93,368
1929..	9,835	5,597	2,899	2,339	2,163	2,645	2,303	2,777	3,809	6,274	19,400	20,103	80,153
1930..	7,770	4,529	3,563	2,320	2,309	2,501	3,130	3,673	4,642	4,397	14,203	18,438	71,475
Total:	22,559	13,634	10,860	9,837	10,402	12,325	10,136	15,463	18,150	21,645	47,259	50,966	252,356
1921..	22,250	14,506	13,320	11,512	14,373	16,606	13,703	15,433	17,121	21,434	45,540	71,957	277,775
1922..	43,123	22,858	16,752	12,436	13,210	16,205	16,863	17,794	18,399	28,087	56,018	73,100	334,845
1923..	37,150	26,395	20,344	15,182	17,319	17,862	19,572	17,543	19,868	26,982	60,445	78,068	356,730
1924..	27,585	19,383	15,048	13,323	16,166	17,487	17,676	17,466	18,683	27,259	61,488	66,794	313,358
1925..	26,122	18,576	17,344	13,809	16,371	21,099	20,724	22,932	24,278	30,738	68,594	75,228	355,815
1926..	26,652	18,119	15,362	13,772	16,573	21,015	17,789	22,376	23,935	28,710	60,422	68,974	339,979
1927..	28,602	20,012	17,560	15,815	17,608	18,571	21,853	21,910	23,564	35,163	59,788	68,537	345,583
1928..	29,067	19,451	16,666	16,571	17,319	20,178	21,885	25,638	27,879	37,262	71,901	75,705	379,522
1929..	32,200	23,764	16,397	17,504	21,621	23,275	19,305	20,034	24,512	32,842	65,870	71,539	368,863
1930..	32,963	24,669	20,192	17,123	16,981	21,833	24,577	23,477	32,131	30,104	62,948	74,313	386,361

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets.

<sup>1</sup>Gross weight includes container and wrapping.

## DAIRY AND POULTRY STATISTICS

851

TABLE 426.—*Poultry, dressed: Receipts, gross weight,<sup>1</sup> at four markets, by State of origin, 1927-1931*

Market and origin	1927	1928	1929	1930	1931	Market and origin	1927	1928	1929	1930	1931
<b>BOSTON</b>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<b>CHICAGO</b>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>	<i>1,000 lbs.</i>
Ill.....	14,203	11,719	10,651	10,497	9,284	Ark.....	238	688	193	216	381
Ind.....	5,225	5,368	3,200	3,677	3,299	Calif.....	55	28	234	78	138
Iowa.....	7,003	6,648	7,609	7,495	8,917	Colo.....	228	293	378	546	433
Kans.....	3,592	4,557	4,917	2,155	3,774	Idaho.....	120	171	551	446	84
Ky.....	453	204	141	365	227	Ill.....	3,593	2,581	3,411	3,521	3,376
Me.....	690	509	500	479	319	Ind.....	4,536	559	778	801	217
Mass.....	495	85	27	37	5	Iowa.....	14,719	13,117	18,505	18,152	13,694
Mich.....	681	888	663	515	424	Kans.....	2,915	4,815	5,108	4,111	4,590
Minn.....	5,886	6,860	6,786	9,024	9,502	Ky.....	208	32	124	113	477
Mo.....	1,509	1,881	2,722	2,328	2,100	Mich.....	66	379	62	111	79
Nebr.....	1,930	3,298	3,163	3,950	3,763	Minn.....	10,541	7,829	13,933	9,891	10,852
N. H.....	62	17	15	25	13	Mo.....	4,812	6,379	6,647	5,985	4,003
N. Y.....	1,467	1,709	757	1,008	942	Mont.....	1,022	1,530	2,904	1,898	1,135
N. Dak.....	469	478	1,473	1,521	2,678	Nebr.....	3,247	4,295	4,169	3,875	4,273
Ohio.....	533	390	140	84	254	N. J.....	78	304	271	-----	194
Okla.....	2,066	2,662	1,864	1,215	1,369	N. Mex.....	38	96	145	226	104
Pa.....	260	104	1	21	200	N. Y.....	715	661	837	455	266
S. Dak.....	46	114	559	377	1,541	N. Dak.....	4,769	5,933	8,502	7,616	6,823
Tenn.....	160	330	510	173	323	Ohio.....	15	26	273	185	50
Tex.....	5,110	5,034	6,693	5,476	7,099	Okla.....	2,250	2,712	2,830	1,880	2,607
Vi.....	26	28	31	31	31	S. Dak.....	6,069	7,371	10,366	9,010	9,282
Wis.....	553	932	268	94	322	Tenn.....	377	361	483	381	393
Other States.....	814	1,761	2,245	742	1,250	Tex.....	2,577	3,302	6,830	6,268	4,459
Canada.....	72	7	-----	-----	149	Wis.....	3,082	3,400	4,811	3,135	2,310
<b>Total.....</b>	<b>53,305</b>	<b>55,583</b>	<b>54,433</b>	<b>51,289</b>	<b>57,782</b>	Wyo.....	133	280	373	444	204
<b>NEW YORK</b>						Other States.....	132	494	650	779	329
Ark.....	78	40	442	532	337	<b>Total.....</b>	<b>63,735</b>	<b>67,180</b>	<b>93,368</b>	<b>80,153</b>	<b>71,476</b>
Calif.....	318	1,117	1,753	1,476	1,668	<b>PHILADELPHIA</b>					
Colo.....	315	1,180	598	1,225	801	Colo.....	108	107	350	16	283
Del.....	56	84	81	29	110	Idaho.....	712	698	432	532	200
Idaho.....	244	1,660	1,780	1,122	1,612	Ill.....	4,232	1,940	1,531	2,807	3,627
Ill.....	28,356	24,864	24,393	28,182	27,594	Ind.....	4,135	3,263	2,917	1,552	1,401
Ind.....	11,585	11,624	11,480	13,637	9,671	Iowa.....	4,179	4,262	5,563	6,577	6,393
Iowa.....	25,226	26,324	30,819	30,295	36,614	Kans.....	1,615	4,901	3,564	2,243	2,496
Kans.....	20,725	21,070	20,448	18,887	16,926	Ky.....	504	542	621	756	218
Ky.....	4,700	5,284	3,050	2,329	2,672	Md.....	84	106	128	82	84
Md.....	757	346	238	283	241	Mich.....	102	47	45	117	266
Mass.....	425	336	847	390	113	Minn.....	4,475	3,062	4,190	7,565	8,707
Mich.....	659	2,561	1,962	1,435	2,374	Mo.....	1,108	1,249	951	1,222	1,570
Minn.....	10,820	13,937	12,914	21,322	24,080	Nebr.....	673	1,089	1,438	1,268	2,416
Mo.....	19,231	19,817	19,305	16,301	13,974	N. J.....	113	305	180	812	197
Mont.....	202	471	315	399	450	N. Y.....	760	683	740	442	310
Nebr.....	7,041	9,067	8,120	8,861	9,512	N. Dak.....	445	620	1,140	882	793
N. J.....	1,022	649	211	178	297	Ohio.....	696	491	397	390	92
N. Y.....	16,438	14,107	12,489	14,415	23,858	Okla.....	2,007	2,710	2,984	2,418	2,508
N. Dak.....	1,028	1,236	1,541	2,099	2,783	Pa.....	824	245	190	60	14
Ohio.....	3,020	2,308	3,399	2,519	3,154	S. Dak.....	132	150	497	922	574
Okla.....	7,314	5,478	7,012	6,410	8,503	Tex.....	1,829	1,745	3,450	3,029	4,815
Oreg.....	148	649	706	338	747	Va.....	1,458	1,097	1,166	853	421
Pa.....	1,332	660	524	637	801	W. Va.....	410	291	313	302	143
S. Dak.....	3,413	3,595	4,692	5,007	6,025	Wis.....	541	570	874	191	125
Tenn.....	4,507	4,512	3,384	2,390	3,890	Other States.....	558	981	1,540	1,274	600
Tex.....	13,102	16,181	18,386	15,301	15,612	<b>Total.....</b>	<b>31,822</b>	<b>31,844</b>	<b>34,064</b>	<b>30,536</b>	<b>38,193</b>
Ula.....	-----	305	559	472	-----						
Va.....	2,220	2,188	2,013	1,886	722						
Wash.....	218	100	619	383	353						
Wis.....	1,843	1,551	934	1,804	1,103						
Wyo.....	-----	499	372	449	510						
Other States.....	698	780	1,115	705	600						
Canada.....	47	47	20	-----	42						
<b>Total.....</b>	<b>189,117</b>	<b>194,376</b>	<b>197,057</b>	<b>200,885</b>	<b>218,911</b>						

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets.

<sup>1</sup> Gross weight includes container and wrapping.

TABLE 427.—Frozen poultry: Cold-storage holdings,<sup>1</sup> by months, United States, 1922-1931

Year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.
1922.....	103,697	103,350	88,709	68,471	50,840	38,602	34,837	30,659	27,671	25,981	30,238	51,781
1923.....	100,170	121,632	113,503	94,872	74,562	57,274	40,100	41,250	34,131	33,142	40,368	87,274
1924.....	93,434	99,498	93,497	76,067	52,068	39,200	34,886	33,604	33,837	40,070	55,130	87,939
1925.....	133,990	138,189	130,513	108,008	82,732	68,126	58,562	53,556	47,949	41,345	55,787	86,733
1926.....	111,501	108,512	95,397	73,124	52,783	42,808	30,730	35,793	38,634	44,771	64,842	106,854
1927.....	144,497	145,076	129,510	104,097	77,282	61,525	50,064	42,293	39,711	43,201	52,515	85,030
1928.....	117,490	118,154	103,494	83,169	56,832	43,872	38,230	40,596	40,749	43,578	58,093	79,173
1929.....	109,684	102,380	89,088	68,728	52,901	41,643	42,001	40,596	49,010	61,970	80,873	115,870
1930.....	140,723	141,552	133,172	105,708	77,420	61,167	54,253	46,967	43,589	46,038	59,269	82,025
1931.....	104,913	101,307	95,188	69,980	45,920	35,348	32,762	30,438	43,066	50,215	65,068	89,071

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

<sup>1</sup> Quantities given net weight.

TABLE 428.—Chickens: Estimated average price per pound received by producers, United States, 1910-1931

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weighted average
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
1910.....	11.0	11.4	11.8	12.2	12.4	12.4	12.2	12.0	11.8	11.4	11.0	10.6	11.3
1911.....	10.6	10.6	10.7	10.9	11.0	11.1	11.2	11.2	11.0	10.6	10.0	9.7	10.4
1912.....	10.0	10.4	10.6	11.0	11.1	11.0	11.2	11.3	11.4	11.4	11.0	10.8	10.9
1913.....	10.8	11.0	11.4	11.7	11.9	12.0	13.0	12.8	12.7	13.0	11.4	11.3	11.7
1914.....	11.5	12.0	12.4	13.0	12.7	13.1	13.4	13.1	12.8	12.0	11.1	10.7	11.8
1915.....	10.9	11.3	11.7	11.9	12.0	12.2	12.2	12.0	12.0	11.8	11.5	11.2	11.6
1916.....	11.5	12.1	12.5	13.1	13.6	14.0	14.1	14.1	14.2	14.4	13.9	13.0	13.4
1917.....	14.1	15.1	15.7	17.3	17.5	17.7	17.4	16.7	18.4	18.5	17.0	17.5	16.9
1918.....	18.4	20.3	20.2	20.7	20.6	21.3	23.2	23.4	23.6	23.2	21.7	22.4	21.6
1919.....	22.1	21.8	23.4	26.7	26.7	26.4	26.8	26.1	25.0	23.2	22.0	22.0	23.4
1920.....	23.3	25.7	26.9	28.4	28.0	27.4	28.4	26.6	26.9	24.6	22.9	20.6	24.3
1921.....	21.7	22.3	22.8	22.2	21.8	21.5	21.7	21.4	20.2	19.1	18.6	18.2	20.1
1922.....	18.9	19.0	19.4	20.0	20.2	20.6	20.7	18.9	18.6	18.1	17.2	17.2	18.4
1923.....	17.3	18.6	18.8	19.4	20.1	20.3	20.6	19.8	19.7	19.0	17.7	16.6	18.3
1924.....	17.5	18.2	18.9	19.4	20.3	20.5	20.2	20.0	19.8	19.4	18.5	17.9	18.8
1925.....	18.5	19.1	20.0	21.1	22.0	21.6	21.4	20.8	20.4	20.0	19.2	19.5	19.9
1926.....	20.9	21.5	21.9	23.1	23.7	23.9	23.6	22.1	21.4	20.8	20.0	19.8	21.2
1927.....	20.1	21.1	21.3	21.8	21.7	20.2	19.9	19.7	19.4	19.7	19.4	19.2	19.9
1928.....	19.6	20.1	20.1	20.8	21.5	21.5	21.9	21.6	22.3	22.0	21.5	21.2	21.2
1929.....	21.6	22.1	22.7	23.8	24.4	24.6	23.7	22.7	22.4	21.5	20.3	19.1	21.5
1930.....	19.8	20.4	20.6	21.1	20.0	19.0	17.4	17.3	17.8	17.4	16.1	15.3	17.6
1931.....	15.7	15.1	16.1	16.7	15.9	16.1	15.8	16.2	15.7	14.4	14.4	13.9	15.0

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by number 1919 census to obtain a price for the United States; yearly price obtained by weighting monthly prices by receipts of dressed poultry. Average price of chickens (live weight) of all ages as reported.

TABLE 429.—Turkeys, live: Estimated average price per pound received by producers, United States, 1913-1931

Season	Oct. 15	Nov. 15	Dec. 15	Jan. 15	Season	Oct. 15	Nov. 15	Dec. 15	Jan. 15
	Cents	Cents	Cents	Cents		Cents	Cents	Cents	Cents
1912.....	13.6	14.4	14.8	14.9	1922.....	25.1	29.5	32.3	29.7
1913.....	14.6	15.2	15.5	15.5	1923.....	26.6	27.9	24.5	23.1
1914.....	14.1	14.1	14.5	14.5	1924.....	23.3	24.2	25.8	26.2
1915.....	13.7	14.8	15.5	15.6	1925.....	24.0	28.3	31.1	31.7
1916.....	17.0	18.6	19.6	19.5	1926.....	26.6	29.8	32.8	31.6
1917.....	20.0	21.0	23.0	22.9	1927.....	26.4	30.8	32.3	29.8
1918.....	28.9	25.7	27.0	27.3	1928.....	27.2	31.2	30.5	28.2
1919.....	26.6	28.3	31.1	32.0	1929.....	27.2	27.1	23.5	23.7
1920.....	30.0	31.8	33.1	33.0	1930.....	21.0	20.1	19.9	21.6
1921.....	25.7	28.2	32.5	30.7	1931.....	17.9	18.3	19.4	18.0

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices, by States, weighted by number 1919 Census to obtain a price for the United States.

TABLE 430.—Eggs: Receipts at six markets by State of origin, 1927-1931

Market and origin	1927	1928	1929	1930	1931	Market and origin	1927	1928	1929	1930	1931
<b>BOSTON</b>	1,000	1,000	1,000	1,000	1,000	<b>NEW YORK—con.</b>	1,000	1,000	1,000	1,000	1,000
Illinois.....	cases	cases	cases	cases	cases	Oregon.....	cases	cases	cases	cases	cases
Indiana.....	310	251	195	161	191	Pennsylvania.....	64	72	48	53	94
Iowa.....	211	152	133	117	101	Tennessee.....	212	191	189	214	168
Kansas.....	307	194	245	272	323	Utah.....	195	186	113	87	36
Maine.....	206	244	253	171	211	Virginia.....	114	217	216	396	554
Massachusetts.....	76	84	70	64	45	Washington.....	111	102	89	79	39
Michigan.....	16	7	6	10	9	Wisconsin.....	655	661	669	760	859
Minnesota.....	41	36	36	35	47	Other States.....	54	54	29	49	57
Missouri.....	219	236	221	229	229	<b>Total.....</b>	264	375	371	250	255
Nebraska.....	131	106	107	64	80						
New Hampshire.....	87	94	128	139	117						
New York.....	25	31	24	28	24						
Ohio.....	41	32	31	27	25	<b>PHILADELPHIA</b>					
Vermont.....	115	53	52	44	55	California.....	24	82	65	112	97
Other States.....	17	22	17	17	15	Delaware.....	16	49	51	44	24
<b>Total.....</b>	1,900	1,757	1,718	1,573	1,636	Illinois.....	110	124	113	124	187
<b>CHICAGO</b>						Indiana.....	129	60	56	44	35
California.....	52	67	54	33	73	Iowa.....	127	128	126	125	154
Illinois.....	152	120	184	150	127	Kansas.....	60	91	71	78	101
Iowa.....	927	826	804	977	959	Maryland.....	35	38	43	55	33
Kansas.....	477	446	315	232	265	Michigan.....	95	61	57	47	69
Michigan.....	37	37	40	22	13	Minnesota.....	151	196	218	237	227
Minnesota.....	583	545	638	772	778	Missouri.....	221	193	167	157	207
Missouri.....	832	674	506	542	555	Nebraska.....	30	29	34	39	37
Nebraska.....	420	438	423	399	340	New York.....	6	24	41	22	20
North Dakota.....	27	35	45	40	51	Ohio.....	96	54	51	47	27
Oklahoma.....	82	96	63	35	34	Pennsylvania.....	97	273	274	287	177
South Dakota.....	445	467	445	508	459	Tennessee.....	59	22	15	25	9
Texas.....	36	97	67	13	21	Virginia.....	129	125	108	86	37
Wisconsin.....	503	427	477	490	382	Washington.....	28	59	61	72	70
Other States.....	328	303	216	262	227	West Virginia.....	13	6	5	4	3
<b>Total.....</b>	4,901	4,601	4,398	4,475	4,314	Wisconsin.....	46	38	52	65	67
<b>NEW YORK</b>						Other States.....	77	93	80	89	143
California.....	502	589	581	698	589	<b>Total.....</b>	1,549	1,735	1,697	1,750	1,730
Delaware.....	87	72	39	39	28	<b>SAN FRANCISCO</b>					
Idaho.....	9	34	32	70	204	California.....	705	710	737	740	730
Illinois.....	950	869	771	829	704	Idaho.....	6	13	3	2	2
Indiana.....	566	468	437	454	387	Oregon.....	19	23	18	8	20
Iowa.....	1,038	1,071	1,254	1,388	1,354	Washington.....	17	6	4	(1)	3
Kansas.....	214	280	318	275	255	Other States.....	3	4	4	6	3
Kentucky.....	97	63	23	31	24	<b>Total.....</b>	750	756	766	765	758
Maryland.....	141	131	88	70	36	<b>LOS ANGELES</b>					
Michigan.....	36	46	42	70	80	California.....	409	604	641	761	730
Minnesota.....	178	204	195	279	353	Idaho.....	22	10	31	22	6
Missouri.....	342	349	403	270	325	Oregon.....	6	7	15	5	14
Nebraska.....	64	132	145	166	273	Utah.....	19	4	20	52	3
New Jersey.....	194	180	214	228	232	Other States.....	4	8	25	4	14
New York.....	605	606	660	625	468	<b>Total.....</b>	460	633	735	844	707
Ohio.....	356	276	204	209	226						

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets. Reported in cases of 30 dozen.

<sup>1</sup> Not over 500 cases.

TABLE 431.—Eggs: Receipts at five markets, by months, specified years

Market and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>
<b>Boston:</b>													
1928.....	102	145	228	211	258	200	168	112	96	96	78	72	1,757
1929.....	133	99	190	290	234	177	176	125	110	77	54	53	1,718
1930.....	96	112	206	227	208	175	138	102	82	66	08	90	1,573
1931.....	126	153	198	207	219	188	125	108	95	77	62	78	1,636
<b>New York:</b>													
1928.....	412	618	931	1,052	1,089	767	591	494	407	392	268	272	7,288
1929.....	394	371	821	1,061	999	837	668	526	444	380	258	335	7,120
1930.....	451	511	938	1,155	1,076	785	645	451	496	373	322	382	7,605
1931.....	478	530	940	1,116	1,052	868	668	516	484	398	304	347	7,001
<b>Philadelphia:</b>													
1928.....	97	133	176	210	246	175	168	117	140	103	75	95	1,735
1929.....	118	76	169	234	220	181	156	143	131	94	74	101	1,607
1930.....	100	112	204	244	261	178	145	94	114	81	86	130	1,750
1931.....	139	148	189	205	184	186	141	132	124	92	97	99	1,730
<b>Chicago:</b>													
1928.....	200	366	592	812	849	562	356	284	241	150	75	113	4,001
1929.....	206	222	554	824	799	554	342	301	210	135	62	89	4,308
1930.....	202	308	641	927	747	516	351	231	211	131	69	111	4,475
1931.....	231	367	634	867	709	559	290	238	191	90	61	71	4,314
<b>San Francisco:</b>													
1928.....	52	63	106	75	61	59	61	69	54	52	49	55	756
1929.....	67	63	82	86	80	65	67	55	49	49	49	54	766
1930.....	59	67	71	79	73	74	69	65	50	55	47	56	765
1931.....	58	66	85	88	72	61	56	59	49	50	54	56	768
<b>Total:</b>													
1919.....	494	1,014	1,550	2,761	2,424	1,890	1,276	1,018	826	691	394	341	14,086
1920.....	508	815	1,447	1,934	2,203	1,805	1,143	911	806	594	398	382	12,040
1921.....	653	1,161	2,209	2,407	2,055	1,561	1,142	1,107	900	727	488	331	15,010
1922.....	809	1,025	1,952	2,902	2,583	1,928	1,304	1,019	816	704	484	402	16,010
1923.....	852	1,032	2,118	2,268	2,852	2,066	1,349	1,180	988	844	565	587	16,691
1924.....	714	1,006	1,654	2,539	2,544	1,871	1,431	1,042	876	748	457	524	15,405
1925.....	618	1,176	1,846	2,568	2,193	2,025	1,315	1,106	930	709	433	626	15,540
1926.....	906	1,070	1,741	2,086	2,261	2,015	1,386	1,081	933	699	581	752	15,511
1927.....	971	1,178	1,997	2,730	2,623	1,767	1,226	1,004	897	704	603	608	16,295
1928.....	963	1,320	2,084	2,361	2,508	1,763	1,334	1,076	938	703	545	607	16,137
1929.....	918	831	1,816	2,595	2,332	1,814	1,409	1,150	944	735	532	632	15,708
1930.....	918	1,110	2,083	2,632	2,365	1,728	1,378	1,043	953	718	592	709	16,167
1931.....	1,026	1,264	2,046	2,478	2,236	1,862	1,180	1,063	943	722	578	651	16,039

Bureau of Agricultural Economics. Compiled from reports of bureau representatives in the various markets. Reported in cases of 30 dozen. See 1927 Yearbook, p. 1098, for data for earlier years.

TABLE 432.—Eggs, case and frozen: Cold-storage holdings, United States, 1922-1931

Kind and year	Jan. 1	Feb. 1	Mar. 1	Apr. 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Nov. 1	Dec. 1
	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>	<i>1,000 cases</i>
<b>Case eggs:</b> <sup>1</sup>												
1922.....	889	179	13	950	4,648	8,056	9,811	10,161	9,608	7,924	5,726	3,267
1923.....	1,311	213	13	453	3,737	7,890	10,222	10,509	9,833	7,797	6,046	4,028
1924.....	1,927	500	44	579	3,563	8,875	8,685	9,267	8,778	7,400	5,267	3,162
1925.....	1,050	81	21	1,240	4,872	7,712	9,482	10,024	9,873	8,612	6,322	3,790
1926.....	1,683	578	77	872	3,735	7,236	9,133	9,845	9,575	8,045	5,885	3,215
1927.....	1,096	253	92	1,868	5,501	8,962	10,565	10,746	9,680	7,960	5,485	2,950
1928.....	882	26	66	1,087	4,515	8,168	10,002	10,496	9,944	8,542	6,247	3,542
1929.....	1,415	248	11	559	3,952	6,705	8,510	8,962	8,547	7,195	4,930	2,651
1930.....	704	139	84	2,231	5,766	9,178	10,743	11,198	10,375	9,174	6,785	4,184
1931.....	1,894	735	408	1,893	5,162	7,887	9,507	9,504	9,016	7,960	5,745	3,447
<b>Frozen eggs:</b> <sup>2</sup>												
1922.....	19,260	16,309	13,193	10,473	14,154	18,273	23,528	27,855	34,516	33,545	30,523	26,233
1923.....	22,787	18,517	14,603	10,311	12,921	20,730	29,686	36,192	37,280	43,836	40,424	36,004
1924.....	32,087	27,682	23,106	20,736	23,707	29,956	33,565	34,194	34,128	31,006	26,633	22,100
1925.....	21,303	16,292	11,364	11,353	19,579	29,544	38,379	42,855	47,099	44,299	45,314	39,336
1926.....	33,905	29,256	24,167	21,849	26,739	34,815	45,688	51,810	52,634	51,062	44,968	38,620
1927.....	33,563	31,207	26,063	33,272	52,053	71,605	81,263	81,418	77,598	71,208	62,066	54,708
1928.....	47,030	38,676	31,362	34,411	51,632	67,941	77,744	81,670	88,196	82,255	73,327	64,201
1929.....	66,181	45,055	35,260	34,918	51,825	71,560	84,766	91,488	88,693	81,541	70,331	61,772
1930.....	63,644	44,080	35,122	49,751	76,664	106,904	115,134	116,272	113,138	106,631	98,359	89,571
1931.....	53,184	75,685	73,899	78,051	91,517	106,607	113,513	114,700	110,271	103,302	94,816	86,407

Bureau of Agricultural Economics. Compiled from reports made by cold-storage establishments.

<sup>1</sup> 30-dozen cases.

<sup>2</sup> Quantities given are net weight.

TABLE 433.—*Eggs and egg products: International trade, average 1925-1929, annual 1927-1930*

## EGGS IN THE SHELL

Country	Calendar year									
	Average 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports
<b>PRINCIPAL EXPORTING COUNTRIES</b>										
Netherlands.....	1,000 dozen	1,000 dozen	1,000 dozen	1,000 dozen	1,000 dozen	1,000 dozen	1,000 dozen	1,000 dozen	1,000 dozen	1,000 dozen
Russia.....	98,429	8,968	103,614	10,502	111,145	11,376	118,909	4,879	124,880	1,324
Poland.....	86,978	0	102,186	0	141,429	0	65,219	0	14,471	0
Denmark.....	70,215	493	96,400	184	80,190	601	78,020	298	80,999	50
China.....	67,641	225	70,405	284	65,750	153	65,474	25	71,852	52
Irish Free State.....	56,278	0	50,285	0	52,059	0	50,489	0	51,300	0
Belgium.....	47,008	449	48,462	372	50,465	547	48,109	275	47,358	106
Italy.....	41,430	1,419	39,958	955	55,819	917	59,405	1,487	42,934	1,726
France.....	25,949	17,969	20,700	22,379	17,675	26,295	15,192	24,071	13,701	33,583
United States.....	24,536	11,496	15,863	9,435	46,584	11,723	38,065	21,619	30,144	21,176
Hungary.....	22,521	350	28,707	250	20,182	286	12,075	308	18,579	317
Bulgaria.....	18,020	338	20,983	299	12,999	410	10,589	431	19,387	204
Rumania.....	17,258	0	18,335	0	15,650	0	18,697	0	28,239	0
Morocco.....	15,011	1	11,696	1	13,328	0	16,989	1	24,725	1
Egypt.....	14,985	0	11,983	0	13,207	0	18,469	0	14,629	0
Algeria.....	10,879	0	9,197	0	10,625	14	12,461	1	8,202	0
Lithuania.....	5,830	17	4,702	4	5,762	30	6,838	48	4,233	15
Sweden.....	5,313	0	5,349	0	5,388	0	4,626	0	4,999	0
Union of South Africa.....	4,422	679	5,486	215	5,432	334	7,419	351	6,543	028
Estonia.....	3,477	113	3,601	128	3,929	146	4,546	48	6,158	47
Norway.....	1,428	4	1,340	0	1,960	20	1,859	0	2,065	1
Finland.....	570	111	08	84	178	102	995	119	1,050	114
Total.....	58	37	26	17	9	74	59	14	637	12
<b>PRINCIPAL IMPORTING COUNTRIES</b>	644,286	42,675	670,374	45,147	730,755	53,032	656,104	53,975	616,708	59,355
United Kingdom.....	973	238,350	065	243,012	1,131	263,740	1,556	247,420	715	264,306
Germany.....	591	220,035	236	225,119	685	245,746	253	239,412	150	210,900
Spain.....	15	34,479	12	35,102	12	45,685	13	44,341	13	39,154
Austria.....	1,730	22,033	2,002	24,788	1,727	25,092	1,773	20,884	1,042	23,893
Japan.....	0	20,465	0	21,700	0	16,289	0	10,074	0	8,167
Switzerland.....	13	17,132	12	16,159	17	16,964	16	18,004	9	20,221
Argentina.....	1,518	9,791	977	10,978	1,073	11,792	452	11,388	1,424	14,846
Cuba.....	0	8,793	0	11,220	0	6,392	0	2,642	0	1,314
Philippine Islands.....	0	5,935	0	5,728	0	6,016	0	7,237	0	6,968
Czechoslovakia.....	1,828	4,917	3,287	4,287	1,999	7,205	1,921	7,114	2,628	7,987
Mexico.....	0	4,202	0	5,009	0	3,903	0	2,295	0	4,361
British Malaya.....	366	3,038	292	4,357	340	3,618	426	4,606	270	4,341
Canada.....	1,365	2,244	448	3,227	988	997	1,143	713	189	2,908
Chile.....	22	67	0	34	0	139	1	164	19	337
Totals.....	8,421	592,081	8,281	610,716	7,972	657,058	7,589	606,293	7,368	620,628

## EGGS NOT IN THE SHELL

Country	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.
<b>PRINCIPAL EXPORTING COUNTRY</b>										
China.....	128,900	0	100,856	0	120,803	0	160,923	0	153,304	0
<b>PRINCIPAL IMPORTING COUNTRIES</b>										
United Kingdom.....	598	65,731	466	70,058	615	65,221	384	74,542	157	85,630
United States.....	464	24,914	661	15,341	508	23,474	326	26,030	196	16,156
Germany.....	2,098	18,252	1,644	17,836	2,383	19,362	2,413	25,544	2,065	27,232
France.....	238	7,375	175	4,978	99	9,026	510	11,919	303	15,504
Netherlands.....	850	4,355	862	3,970	1,064	4,133	791	5,485	1,006	5,568
Canada.....	0	1,700	0	2,025	0	2,030	0	560	0	1,753
Italy.....	16	1,817	27	953	28	1,376	6	1,647	12	1,854
Belgium.....	216	1,137	85	1,110	194	1,169	589	1,626	456	1,643
Irish Free State.....	19	1,031	37	1,060	13	883	4	1,067	10	1,126
Sweden.....	5	859	0	678	1	828	2	1,232	19	1,074
Czechoslovakia.....	13	850	22	812	9	901	7	1,233	7	1,566
Austria.....	8	690	0	350	27	715	5	1,632	1	1,380
Denmark.....	7	512	6	461	11	293	1	458	7	778
Union of South Africa.....	16	54	5	40	0	24	0	14	31	7
Norway.....	0	11	0	6	0	10	0	10	0	22
Total.....	4,558	128,778	3,890	119,703	4,954	130,445	5,044	153,010	4,293	161,288

Bureau of Agriculture Economics. Official sources except where otherwise noted. In countries reporting in units of weight, the conversion factor used is 1½ pounds equals 1 dozen.

<sup>1</sup> Preliminary.<sup>2</sup> International Yearbook of Agricultural Statistics.<sup>3</sup> 4-year average.

TABLE 434.—Eggs: Average price per dozen at five markets, by months, specified years

Market, grade, and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
<b>New York:</b>													
Fresh firsts—	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1910.....	38	27	23	22	21	20	18	21	24	26	31	34	25
1911.....	28	19	17	17	17	15	17	18	21	24	32	35	22
1912.....	34	36	22	20	19	19	20	21	24	26	31	29	25
1913.....	24	22	19	19	20	19	19	23	27	29	39	36	25
1914.....	33	29	26	20	20	21	21	24	26	27	35	38	27
1915.....	38	26	20	21	20	20	20	22	26	30	35	34	28
1916.....	31	26	22	22	22	23	25	29	33	34	41	40	30
1917.....	46	45	31	34	35	33	34	38	41	41	49	57	40
1918.....	65	58	38	35	35	36	41	43	47	53	65	67	49
1919.....	62	44	44	43	46	44	46	48	51	62	60	79	53
1920.....	71	50	48	44	44	43	47	51	67	64	77	78	57
1921.....	67	42	31	27	25	27	33	35	39	49	58	54	41
1922.....	41	38	25	26	27	25	24	26	39	43	53	53	35
1923.....	42	37	31	27	27	24	25	29	35	39	53	47	35
1924.....	42	39	25	24	25	27	29	33	39	44	52	57	36
1925.....	59	44	30	29	32	33	33	37	43	56	51	40	38
1926.....	38	31	29	32	31	30	29	31	38	40	50	48	36
1927.....	42	32	25	26	28	23	25	28	34	40	44	45	32
1928.....	45	32	29	28	30	29	30	31	33	32	37	37	33
1929.....	36	41	33	28	31	31	32	34	36	40	48	51	37
1930.....	42	35	26	27	28	24	22	25	25	26	31	29	28
1931.....	24	20	22	20	19	19	20	22	24	24	28	27	22
<b>Chicago:</b>													
Fresh firsts—													
1927.....	38	27	24	23	22	22	23	26	33	37	42	43	30
1928.....	43	29	27	27	28	28	28	30	32	34	41	39	32
1929.....	36	38	29	26	30	29	31	33	37	42	47	48	35
1930.....	40	34	24	24	21	22	21	25	26	28	33	28	27
1931.....	21	16	19	17	17	16	18	19	20	24	29	24	20
<b>Boston:</b>													
Western firsts—													
1927.....	41	31	26	25	24	23	25	28	34	39	44	44	32
1928.....	46	35	29	29	30	30	30	32	34	36	44	43	35
1929.....	38	43	32	28	31	31	32	35	37	40	49	52	37
1930.....	44	37	26	26	24	24	22	25	26	26	34	28	30
1931.....	25	18	21	20	18	17	19	20	21	25	30	27	22
<b>Philadelphia:</b>													
Extra firsts—													
1927.....	43	33	27	26	26	25	28	33	40	48	55	50	36
1928.....	50	37	30	30	32	32	33	36	39	42	50	45	38
1929.....	41	45	35	29	33	34	36	39	44	49	56	58	41
1930.....	46	40	28	28	28	27	28	32	33	36	44	32	33
1931.....	28	20	22	21	19	21	24	24	26	29	34	31	25
<b>San Francisco:</b>													
Fresh extras—													
1927.....	33	25	23	24	24	24	26	32	39	47	44	38	32
1928.....	33	24	25	25	26	26	30	33	39	44	45	38	33
1929.....	31	26	25	26	31	32	37	41	44	52	49	44	36
1930.....	36	28	28	28	27	26	26	31	37	40	41	27	31
1931.....	22	19	20	20	20	20	22	26	31	38	38	20	25

Bureau of Agricultural Economics. Prices 1910-1922 are averages of daily prices in New York Journal of Commerce. Subsequently monthly prices from the Bureau of Labor Statistics, except San Francisco, which is from the Pacific Dairy Review. Earlier data are available in 1925 Yearbook, p. 1224, Table 636, and 1927 Yearbook, p. 1105.

TABLE 435.—Eggs: Estimated average price per dozen received by producers, United States, 1910-1931

Year	Jan. 15	Feb. 15	Mar. 15	Apr. 15	May 15	June 15	July 15	Aug. 15	Sept. 15	Oct. 15	Nov. 15	Dec. 15	Weighted average
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1910.....	29.7	25.9	20.8	18.6	18.4	18.2	17.9	18.5	20.9	23.8	27.2	29.7	20.5
1911.....	26.2	19.3	15.7	14.8	14.6	14.4	14.8	16.4	18.7	21.8	26.1	29.1	16.9
1912.....	20.3	26.8	21.2	17.4	16.9	16.7	17.0	18.2	20.6	24.0	27.8	28.2	19.8
1913.....	24.8	21.1	17.9	15.9	16.1	16.8	16.4	17.7	21.3	26.0	31.3	32.9	18.8
1914.....	29.8	25.3	22.2	16.4	16.9	17.2	17.5	19.1	22.5	23.7	28.2	31.9	20.1
1915.....	31.7	23.7	16.5	16.6	16.5	16.1	16.3	17.3	20.6	24.6	29.4	31.1	18.9
1916.....	28.8	24.2	18.2	17.7	18.5	18.9	19.9	21.6	25.3	30.4	34.9	38.3	21.4
1917.....	38.1	35.7	25.3	28.5	30.2	29.9	29.0	30.5	35.8	38.5	41.2	45.9	31.3
1918.....	48.9	45.8	30.9	30.4	30.6	29.5	33.0	35.2	39.1	44.9	51.7	59.3	35.2
1919.....	55.3	34.8	33.9	36.0	38.9	36.1	37.9	40.6	43.1	51.0	59.1	69.6	39.9
1920.....	60.9	48.5	40.5	36.6	37.5	35.9	37.8	42.5	43.6	54.6	62.9	67.1	42.3
1921.....	54.5	31.0	26.8	20.5	19.4	20.1	24.3	28.9	30.9	39.4	50.0	51.1	26.9
1922.....	31.7	31.4	19.5	20.0	20.9	20.2	20.3	20.6	27.3	34.6	43.6	47.2	23.9
1923.....	37.8	29.9	25.4	21.6	21.8	20.9	21.3	23.6	29.8	34.6	45.6	45.5	25.6
1924.....	35.4	33.6	20.4	19.1	19.8	21.1	22.8	26.1	31.8	38.2	45.8	49.9	25.2
1925.....	48.6	35.7	23.9	24.2	24.8	26.1	27.9	30.0	31.1	37.7	46.8	48.1	29.1
1926.....	36.3	28.9	24.1	24.8	25.2	25.7	25.7	26.4	31.5	36.8	44.9	47.6	27.9
1927.....	36.9	29.0	20.8	20.3	19.8	17.8	20.7	23.4	29.4	35.6	41.6	43.3	23.8
1928.....	38.3	29.1	23.4	22.8	24.2	23.0	25.6	27.4	31.4	34.9	39.6	42.9	26.8
1929.....	33.0	31.9	28.0	23.0	24.4	26.1	27.2	29.8	33.9	38.4	44.2	45.8	28.6
1930.....	38.4	31.8	21.3	21.5	20.0	18.6	18.8	20.6	25.3	26.5	31.7	26.8	22.7
1931.....	22.1	14.1	17.0	16.2	13.3	14.1	14.8	17.3	19.1	22.7	26.4	25.6	16.0

Bureau of Agricultural Economics. Based on returns from special price reporters. Monthly prices by States, weighted by production 1919 census to obtain a price for the United States. Yearly price obtained by weighting monthly prices by receipts monthly.

# STATISTICS OF FOREIGN TRADE IN AGRICULTURAL PRODUCTS

TABLE No. 436.—Summary of exports and imports, United States, 1908-9 to 1930-31

Year beginning July—	Total exports	Agricultural exports <sup>1</sup>			Agricultural imports <sup>1</sup>		Excess of agricul- tural exports	Forest products				
		Domestic		Reex- ports	Total imports	Value		Per- cent- age of total	Exports		Excess of im- ports	
		Value	Per- cent- age of total						Do- mestic	Reex- ports		Im- ports
	1,000 dollars	1,000 dollars	Per cent	1,000 dollars	1,000 dollars	1,000 dollars	Per cent	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	
1908-9..	1,638,350	903,238	55.1	12,779	1,311,920	708,323	53.6	212,694	72,442	1,789	60,753	13,478
1909-10..	1,710,084	871,158	50.9	22,162	1,556,947	794,370	51.0	98,950	85,080	2,110	75,010	12,130
1910-11..	2,013,548	1,030,794	51.2	20,573	1,527,226	773,116	50.6	278,251	103,039	1,079	71,736	32,982
1911-12..	2,170,320	1,050,627	48.4	17,171	1,653,265	888,495	53.7	179,303	108,122	1,350	69,581	39,891
1912-13..	2,428,506	1,123,632	46.3	19,652	1,813,008	916,634	50.6	226,670	124,836	2,809	82,878	44,787
1913-14..	2,329,684	1,113,974	47.8	20,288	1,893,926	1,000,409	52.8	133,851	106,979	1,961	81,162	27,778
1914-15..	2,716,178	1,475,938	54.3	33,222	1,674,170	997,911	59.6	516,249	52,554	1,287	79,451	25,610
1915-16..	4,272,178	1,518,071	35.5	45,017	2,197,884	1,349,568	61.4	213,525	68,155	1,435	94,265	24,675
1916-17..	6,327,164	1,968,253	31.6	45,420	2,650,355	1,599,660	60.2	414,013	68,919	3,392	120,580	57,269
1917-18..	6,838,652	2,280,466	39.1	44,210	2,945,655	1,826,436	62.0	498,240	87,181	1,400	128,490	39,900
1918-19..	7,081,493	3,579,918	50.6	105,587	3,095,720	1,930,028	62.3	1,755,477	113,275	3,758	132,588	15,555
1919-20..	7,949,309	3,861,511	48.6	128,191	3,238,362	3,410,018	65.1	579,684	190,049	5,380	220,091	33,602
1920-21..	6,385,884	2,607,641	40.8	90,739	3,654,459	2,060,237	56.4	638,143	141,876	4,013	225,162	79,243
1921-22..	3,699,606	1,915,866	51.8	43,589	2,608,079	1,371,720	52.6	587,735	94,115	2,315	150,843	70,413
1922-23..	3,886,682	1,799,168	46.3	48,393	3,780,959	2,077,240	54.9	529,679	129,981	1,955	234,508	102,662
1923-24..	4,223,973	1,867,098	44.2	62,719	3,554,037	1,876,365	52.8	54,452	162,374	1,593	210,712	52,775
1924-25..	4,778,155	2,280,381	47.7	64,168	3,824,128	2,057,163	53.8	287,386	156,187	1,290	227,423	69,046
1925-26..	4,653,148	1,891,739	40.7	76,162	4,464,872	2,529,775	56.7	562,874	162,731	1,450	238,545	74,384
1926-27..	4,867,346	1,907,864	39.2	72,222	4,252,024	2,281,421	53.7	301,335	171,970	1,355	238,247	64,912
1927-28..	4,773,332	1,815,451	38.0	73,391	4,147,409	2,193,868	52.0	305,026	174,599	1,528	216,874	30,747
1928-29..	5,283,938	1,847,216	35.0	63,942	4,201,888	2,170,046	50.8	267,888	178,092	2,157	222,240	42,000
1929-30..	4,617,730	1,495,907	32.4	50,670	3,848,971	1,890,508	49.1	343,031	161,743	1,382	200,418	46,293
1930-31..	3,031,817	1,038,040	34.2	28,808	2,432,152	1,163,059	47.8	96,216	97,704	878	142,580	44,007

Bureau of Agricultural Economics. This table supersedes Table No. 500 in the Yearbook of Agriculture, 1931, the value of total imports and exports has been given and the imports of "rubber, unmanufactured, and similar gums" have been deducted from the "imports of forest products" and added to "imports of agricultural products," also reexports of "rubber, unmanufactured, and similar gums" have been deducted from "reexports of forest products" and added to "reexports of agricultural products." "Rubber, unmanufactured, and similar gums," includes: Balata, guayule, gutta-percha, or Jelutong or pontianak, gutta-percha, India rubber crude, and India rubber scrap or refuse, fit only for remanufacture.

<sup>1</sup> Does not include forest products, but includes rubber now mostly a plantation product.

<sup>2</sup> Excess of agricultural imports.

<sup>3</sup> Excess of exports.

TABLE 437.—Agricultural products: Value of trade between continental United States and noncontiguous Territories, 1921-22 to 1930-31

Year beginning July—	Puerto Rico		Hawaii		Alaska	
	United States ship-ments to	Ship-ments to United States	United States ship-ments to	Ship-ments to United States	United States ship-ments to	Ship-ments to United States
	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars
1921-22	21,926	53,892	12,734	66,392	7,123	13
1922-23	24,080	61,801	15,096	93,313	8,267	190
1923-24	28,819	66,581	17,539	104,267	9,016	385
1924-25	29,710	70,190	17,954	97,430	9,774	415
1925-26	32,212	70,385	17,806	105,470	9,539	516
1926-27	32,603	84,061	18,019	98,600	9,737	720
1927-28	28,146	82,326	19,004	110,338	9,435	261
1928-29	31,466	63,333	19,348	103,653	9,108	290
1929-30	28,117	75,868	19,883	98,097	9,267	511
1930-31 <sup>1</sup>	25,061	75,320	17,759	102,932	6,980	380

Bureau of Agricultural Economics. Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1923-1931.

<sup>1</sup> Preliminary.

TABLE 438.—*Agricultural products: Value of principal groups exported from and imported into the United States, 1928-29 to 1930-31*

Article	Year beginning July—					
	Domestic exports			General imports		
	1928-29	1929-30	1930-31 <sup>1</sup>	1928-29	1929-30	1930-31 <sup>1</sup>
<b>ANIMALS AND ANIMAL PRODUCTS</b>						
	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars
Animals, live.....	6,068	5,307	2,955	29,634	21,148	5,312
Dairy products.....	17,668	16,675	12,248	37,764	31,907	16,942
Eggs and egg products.....	5,145	4,470	3,472	8,130	8,851	2,890
Hides and skins, raw (except fur).....	9,112	5,896	4,208	131,780	129,890	60,734
Meat and meat products.....	187,873	181,585	117,194	30,654	23,754	6,893
Silk, unmanufactured.....				393,648	300,682	227,323
Wool and mohair, unmanufactured.....	107	103	55	80,521	59,414	24,338
Animal products, miscellaneous.....	13,058	11,184	7,467	40,862	40,686	27,647
Total animals and animal products.....	239,621	225,120	147,599	758,993	676,333	372,129
<b>VEGETABLE PRODUCTS</b>						
Chocolate and cocoa.....	606	616	449	45,771	40,755	28,029
Coffee.....	2,627	2,746	2,790	308,268	256,541	192,820
Cotton lint, unmanufactured.....	861,090	667,243	422,104	56,437	42,078	5,328
Linters.....	7,120	3,959	2,453			
Total cotton, unmanufactured.....	868,219	671,202	424,557	56,437	42,078	5,328
Fruits.....	149,349	110,431	120,585	56,392	60,889	47,300
Grains and grain products.....	335,425	248,288	146,680	37,028	24,280	26,265
Nuts.....	1,528	1,898	1,169	81,208	24,765	17,788
Oilseeds and oilseed products.....	40,707	32,875	15,005	188,383	167,286	101,086
Rubber and similar gums.....				235,075	195,080	96,113
Seeds, except oilseeds.....	2,854	3,755	3,198	9,343	7,819	5,315
Spices.....	296	344	178	18,811	18,435	11,162
Sugar, molasses, and sirups.....	9,951	6,489	4,060	227,625	176,565	126,527
Tea.....				26,068	24,321	21,904
Tobacco, unmanufactured.....	148,077	148,452	142,283	55,803	47,556	37,601
Vegetables and preparations.....	23,333	23,638	15,403	39,880	49,823	28,298
Vegetable products, miscellaneous.....	24,623	20,573	13,578	82,385	77,383	45,345
Total vegetable products.....	1,007,595	1,270,787	890,441	1,419,575	1,214,176	790,930
Total animal and vegetable products.....	1,847,216	1,495,907	1,038,040	2,178,568	1,890,508	1,163,059
<b>FOREST PRODUCTS</b>						
Dyeing and tanning materials.....	2,414	2,258	1,621	8,019	8,065	5,524
Gums, resins, and balsams.....	28,701	28,511	17,635	35,969	29,134	15,605
Wood.....	138,635	122,648	72,777	86,210	79,019	51,728
Forest products, miscellaneous.....	8,342	8,326	5,671	92,051	93,170	69,832
Total forest products.....	178,092	161,743	97,704	222,249	209,418	142,589
Total agricultural products.....	2,025,308	1,657,650	1,135,744	2,400,817	2,099,926	1,305,648

Bureau of Agricultural Economics. Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1929 and 1931. In the statistics of foreign commerce of the United States, the Philippine Islands are treated as a foreign country. The statistics of foreign commerce include the trade of the customs districts of Alaska, Hawaii, and Porto Rico with foreign countries, but do not include the trade of these Territories with the United States.

<sup>1</sup>Preliminary.

TABLE 439.—Index numbers of United States agricultural exports, 1909-10 to 1930-31

[Base 1910-1914=100]

Year beginning July—	All commodities	All commodities except cotton	Cotton fiber	Grains and products	Cattle and meat products	Dairy products	Fruits	Tobacco
1909-10.....	78	80	73	82	91	54	76	91
1910-11.....	92	92	91	85	104	63	80	90
1911-12.....	114	100	125	78	115	126	101	97
1912-13.....	110	119	103	143	97	120	136	107
1913-14.....	106	103	105	112	92	103	98	114
1914-15.....	138	189	99	301	126	302	119	89
1915-16.....	118	184	70	237	161	479	109	113
1916-17.....	118	182	70	217	161	710	101	105
1917-18.....	101	165	53	179	197	975	111	160
1918-19.....	145	255	63	272	287	1,287	122	165
1919-20.....	134	207	80	218	185	1,275	108	129
1920-21.....	127	212	64	329	154	524	105	118
1921-22.....	137	218	70	317	153	571	121	116
1922-23.....	112	182	59	246	100	406	214	152
1923-24.....	104	133	67	143	179	451	184	110
1924-25.....	126	167	95	225	140	396	211	137
1925-26.....	106	128	93	117	114	327	301	132
1926-27.....	136	143	131	188	98	288	254	125
1927-28.....	112	138	92	188	98	263	372	144
1928-29.....	117	141	90	174	102	243	216	153
1929-30.....	97	117	82	130	101	221	337	150
1930-31.....	90	101	81	104	74	190		

Bureau of Agricultural Economics. Computations are based on the gross exports of 44 of the most important farm products. The index numbers were calculated as follows: Quantities of various commodities exported each year were multiplied by the average yearly export prices of these commodities from July, 1909, to June, 1914. The sum of the values determined in this way was then divided by the average yearly value of exports from 1909-10 to 1913-14 to obtain the index.

TABLE 440.—Exports and imports of selected forest products, 1909-10 to 1930-31

Year beginning July—	Domestic exports					Imports				
	Lumber		Rosin	Spirits of turpentine	Timber, hewn and sawed	Camphor, crude	Lumber		Shellac	Wood pulp
	Boards, deals, and planks	Staves					Boards, deals, planks and other sawed	Shingles		
	1,000 sq feet	Thousands	1,000 barrels	1,000 gallons	1,000 sq feet	1,000 pounds	1,000 sq feet	1,000 sq feet	1,000 pounds	1,000 long tons
1909-10.....	1,684	49,784	2,144	15,888	491	3,007	1,064	703	29,402	378
1910-11.....	2,032	65,726	2,100	14,818	532	3,726	872	643	15,495	492
1911-12.....	2,307	64,103	2,474	19,599	438	2,155	905	515	18,749	478
1912-13.....	2,550	89,006	2,806	21,094	512	3,709	1,091	590	21,912	502
1913-14.....	2,405	77,151	2,418	18,901	441	3,477	929	895	16,720	508
1914-15.....	1,129	39,297	1,372	9,464	174	3,720	939	1,487	24,153	588
1915-16.....	1,177	37,538	1,571	9,310	201	4,574	1,218	1,769	25,818	507
1916-17.....	1,042	61,469	1,639	8,242	184	6,585	1,175	1,924	32,540	690
1917-18.....	1,068	63,207	1,071	5,095	106	3,638	1,283	1,878	22,913	504
1918-19.....	1,073	62,753	882	8,065	92	2,623	977	1,767	14,269	475
1919-20.....	1,518	80,791	1,322	7,461	234	4,026	1,492	2,152	24,151	727
1920-21.....	1,269	65,710	877	9,742	123	2,993	920	1,831	23,872	624
1921-22.....	1,543	35,162	788	10,786	268	1,592	1,124	2,190	30,768	902
1922-23.....	1,549	57,466	1,040	9,012	383	3,498	1,958	2,695	32,773	1,293
1923-24.....	1,867	60,868	1,208	11,194	815	1,965	1,786	2,417	28,512	1,188
1924-25.....	1,929	79,922	1,412	12,308	586	1,904	1,732	2,551	21,436	1,469
1925-26.....	1,985	75,534	1,073	10,254	652	2,616	1,869	2,482	26,188	1,450
1926-27.....	2,013	74,826	1,229	13,820	707	2,175	1,841	2,275	28,707	1,609
1927-28.....	2,318	78,466	1,300	14,832	826	2,704	1,629	2,034	23,012	1,621
1928-29.....	2,387	82,409	1,309	14,175	711	5,064	1,441	2,052	31,548	1,643
1929-30.....	2,100	78,624	1,368	15,722	657	1,777	1,461	1,387	20,444	1,722
1930-31.....	1,468	47,207	1,104	13,292	406	1,246	916	1,058	14,145	1,456

Bureau of Agricultural Economics. Compiled from Foreign Commerce and Navigation of the United States, 1909-1913, and Monthly Summary of Foreign Commerce of the United States, June issues, 1920-1931.

1 Preliminary.

TABLE 441.—Exports of selected domestic agricultural products, averages 1899-1900 to 1908-9, annual 1909-10 to 1930-31

Year beginning July—	Butter	Cheese	Milk, condensed and evaporated	Eggs in the shell	Pork and its products, total <sup>1</sup>	Pork, fresh	Pork, pickled	Bacon, including Cumberland sides	Hams and shoulders, including Wiltshire sides	Lard
Average:	1,000 pounds	1,000 pounds	1,000 pounds	1,000 dozen	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
1899-1900 to 1903-4.....	15,425	31,552	(?)	3,125	1,305,217	28,000	119,050	361,686	208,954	576,414
1904-5 to 1908-9	12,484	11,849	(?)	5,439	1,245,682	13,157	125,799	271,929	208,230	622,299
1909-10.....	3,141	2,547	13,311	5,326	707,110	1,040	40,032	152,163	146,855	362,928
1910-11.....	4,878	10,367	12,180	8,559	879,455	1,355	45,720	158,675	57,709	476,108
1911-12.....	0,092	6,338	20,643	15,406	1,071,952	2,598	56,321	208,574	204,044	532,256
1912-13.....	3,586	2,599	16,526	20,409	934,697	2,458	53,740	200,964	159,545	519,025
1913-14.....	3,694	2,428	16,209	16,149	921,913	2,668	45,543	193,964	165,882	481,458
1914-15.....	9,851	55,368	37,236	20,784	1,106,180	3,908	45,656	348,718	203,701	473,532
1915-16.....	13,487	44,394	159,578	26,396	1,432,697	63,006	63,461	570,506	282,209	427,011
1916-17.....	26,835	66,500	256,141	24,928	1,501,948	50,426	46,998	667,152	266,657	444,770
1917-18.....	17,736	44,303	628,759	18,969	1,682,124	21,390	33,222	815,294	419,572	392,508
1918-19.....	38,740	18,792	728,741	26,385	2,704,694	19,644	31,224	1,238,247	667,240	724,771
1919-20.....	27,156	19,378	708,463	38,327	1,762,611	27,225	31,643	603,637	275,456	587,225
1920-21.....	7,829	10,828	262,688	26,960	1,522,163	67,075	33,288	498,298	172,642	746,157
1921-22.....	7,512	7,471	277,311	33,762	1,516,320	25,911	38,510	350,549	311,269	952,642
1922-23.....	9,410	8,446	157,039	34,294	1,794,880	43,772	40,934	423,334	319,864	1,014,598
1923-24.....	5,425	3,938	218,613	32,832	1,934,198	49,113	37,699	423,500	292,214	793,735
1924-25.....	8,394	9,432	135,547	25,107	1,400,149	27,603	26,726	236,265	229,214	695,445
1925-26.....	5,280	4,064	108,855	27,931	1,172,685	15,867	29,126	156,153	127,578	143,640
1926-27.....	5,048	3,773	108,942	27,932	1,012,668	10,881	27,962	127,578	143,640	875,812
1927-28.....	3,975	2,873	115,943	22,832	1,046,309	11,089	31,650	126,977	127,819	718,398
1928-29.....	3,968	2,572	112,492	15,982	1,112,394	10,641	39,906	126,248	128,896	780,914
1929-30.....	3,582	2,339	101,372	14,234	1,138,588	18,768	39,906	132,967	130,318	787,180
1930-31 <sup>2</sup> .....	2,299	1,733	78,986	14,380	791,353	11,099	21,118	52,412	99,749	585,070

Year beginning July—	Beef and its products, total <sup>4</sup>	Oleo oil	Cotton lint <sup>5</sup>	Linters <sup>6</sup>	Cotton-seed cake and meal	Linseed cake and meal	Prunes	Raisins	Apples, fresh	Oranges	Sugar, raw and refined <sup>8</sup>
Average:	1,000 pounds	1,000 pounds	1,000 bales	1,000 bales	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 barrels	1,000 boxes	1,000 sh. tons
1899-1900 to 1903-4.....	636,969	147,626	6,669	-----	1,074,720	552,190	39,767	3,314	1,109	(?)	6
1904-5 to 1908-9	599,332	188,550	8,303	-----	1,173,349	684,450	35,008	6,856	1,239	(?)	16
1909-10.....	286,296	126,092	6,413	-----	640,089	652,317	89,015	8,526	922	932	63
1910-11.....	285,924	138,697	8,068	-----	801,597	559,675	51,031	18,660	1,721	1,179	28
1911-12.....	233,925	126,467	11,070	-----	1,203,690	596,115	74,328	19,949	1,456	1,197	40
1912-13.....	170,208	92,860	9,125	-----	1,128,092	838,120	117,951	28,121	2,150	1,063	22
1913-14.....	161,212	97,017	9,522	-----	799,974	602,569	69,814	14,766	1,507	1,559	26
1914-15.....	394,981	50,482	8,581	226	1,479,065	524,794	43,479	24,845	2,352	1,789	275
1915-16.....	457,556	102,646	5,917	251	1,067,222	640,916	57,423	75,015	1,406	1,575	815
1916-17.....	423,674	67,110	5,702	474	1,150,160	536,984	59,045	51,993	1,740	1,850	025
1917-18.....	000,132	56,003	4,455	186	44,681	151,400	32,927	54,988	685	1,240	283
1918-19.....	591,302	59,292	5,442	84	311,624	202,788	59,072	84,150	1,576	1,402	588
1919-20.....	368,002	74,539	7,035	52	440,573	336,336	114,068	86,857	1,051	1,619	722
1920-21.....	403,515	6,570	5,570	53	454,701	391,204	57,461	21,492	2,665	2,001	292
1921-22.....	222,462	117,174	6,592	126	532,721	484,059	109,398	40,639	1,094	1,641	1,001
1922-23.....	194,912	104,956	5,205	48	454,350	574,612	79,229	93,962	1,756	1,709	375
1923-24.....	185,372	92,965	5,784	115	250,360	560,114	136,448	88,152	4,098	2,592	135
1924-25.....	100,211	105,145	8,239	200	885,375	691,120	171,771	90,783	3,201	2,197	251
1925-26.....	152,320	90,410	8,110	102	716,505	589,166	161,405	135,027	3,072	2,263	300
1926-27.....	151,531	92,720	11,281	278	990,516	625,121	175,644	152,327	7,098	3,340	114
1927-28.....	106,955	64,851	7,890	230	664,528	606,304	260,625	193,099	3,144	2,988	106
1928-29.....	101,303	63,187	8,520	219	571,200	645,120	273,051	221,756	7,014	4,228	128
1929-30.....	102,080	61,088	7,096	143	338,240	624,060	142,989	128,097	8,426	3,674	79
1930-31 <sup>3</sup> .....	98,379	54,961	7,048	132	87,300	304,640	296,254	125,100	6,780	3,984	70

Footnotes at end of table.

TABLE 441.—Exports of selected domestic agricultural products, averages 1899-1900 to 1908-09, annual 1909-10 to 1930-31—Continued

Year beginning July—	Barley, including flour and malt <sup>1</sup>	Corn, including corn meal	Oats, including oat meal	Rice, including flour, meal, and broken rice	Rye, including flour	Wheat, including flour	Tobacco, unmanufactured <sup>2</sup>	Glucose and grape sugar	Hops	Starch, including corn-starch
Average:	1,000 bushels	1,000 bushels	1,000 bushels	1,000 pounds	1,000 bushels	1,000 bushels	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
1899-1900 to 1903-4	11,931	111,484	22,188	3,811	2,731	196,690	328,321	167,108	11,420	68,173
1904-5 to 1908-9	9,907	77,887	13,614	17,009	1,186	116,181	321,197	151,690	15,613	52,143
1909-10	4,454	38,128	2,549	7,050	242	89,173	357,190	140,820	10,589	51,536
1910-11	9,507	65,615	3,846	15,875	40	71,338	355,327	181,963	13,105	158,239
1911-12	1,655	41,797	2,678	26,798	31	81,691	379,845	171,166	12,101	85,645
1912-13	17,874	50,780	26,455	24,801	1,856	145,159	418,797	200,140	17,561	110,598
1913-14	6,945	10,726	2,749	18,223	2,273	147,955	449,750	190,531	24,263	70,714
1914-15	28,712	50,668	100,609	75,449	13,027	335,702	348,346	155,468	10,210	107,037
1915-16	30,821	39,897	98,900	120,635	15,250	240,221	443,293	186,406	22,410	210,185
1916-17	20,319	66,783	95,106	181,372	13,708	205,952	411,599	214,973	4,825	140,424
1917-18	28,717	48,073	125,081	196,363	17,186	132,579	289,171	97,858	3,495	75,353
1918-19	20,997	23,019	109,005	198,128	36,467	287,402	620,258	136,230	7,467	142,796
1919-20	34,555	16,726	48,436	483,385	41,531	222,030	648,058	245,264	30,780	237,600
1920-21	27,255	70,006	9,391	440,855	47,337	309,313	506,526	141,954	22,208	137,365
1921-22	21,909	36,586	25,413	370,670	29,944	282,566	463,389	273,082	19,522	386,873
1922-23	18,913	28,135	8,796	227,757	19,602	159,880	597,320	148,051	20,481	219,242
1923-24	25,043	9,791	16,777	112,037	50,242	280,803	430,702	130,577	16,122	214,247
1924-25	30,459	24,883	39,687	48,175	12,647	108,035	537,240	170,142	14,998	324,560
1925-26	19,455	19,819	15,041	304,358	21,697	219,100	518,401	148,759	13,309	233,111
1926-27	39,274	19,409	9,823	309,788	28,348	260,250	489,996	145,951	11,812	281,388
1927-28	60,295	41,876	16,251	392,684	9,488	163,687	565,025	123,366	8,830	235,090
1928-29	24,054	10,270	7,966	280,532	2,598	158,247	600,180	101,816	6,793	203,343
1929-30	11,443	3,317	3,123	281,005	227	131,477	591,020	70,571	5,593	104,807
1930-31 <sup>3</sup>										

Year beginning July—	Corn-starch <sup>4</sup>	Apples, dried	Apricots, dried	Apricots, canned <sup>5</sup>	Pears, canned <sup>6</sup>	Peaches, canned <sup>6</sup>	Pine-apples, canned <sup>6</sup>	Grapes	Pears, fresh <sup>10</sup>	Grape-fruit, fresh
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 boxes
1912-13	41,575	35,017								
1913-14	33,566	17,402								
1914-15	42,589	23,764								
1915-16	16,219	23,940								
1916-17	10,358	9,841								
1917-18	38,659	2,603	5,280							
1918-19	106,727	18,909	20,975							
1919-20	163,315	11,819	26,768							
1920-21	110,514	18,058	8,332							
1921-22	848,940	12,431	16,738							
1922-23	254,060	12,817	11,193	13,809	49,368	54,624	21,848	14,022	36,785	252
1923-24	255,135	80,323	38,777	26,576	38,431	50,374	25,238	20,257	50,237	305
1924-25	209,865	19,226	13,292	31,360	53,851	57,300	26,252	20,302	41,452	427
1925-26	208,463	24,833	18,132	29,547	75,876	83,169	37,543	24,284	71,205	270
1926-27	212,375	32,670	17,901	35,896	66,104	81,896	37,426	30,791	73,877	613
1927-28	275,821	21,704	23,684	29,013	52,671	86,634	51,227	38,810	51,056	719
1928-29	231,667	50,024	24,652	26,249	62,052	101,438	47,533	55,638	82,947	940
1929-30	200,558	28,769	19,101	33,235	54,709	74,470	46,309	46,158	62,024	854
1930-31 <sup>4</sup>	102,886	38,121	23,647	19,024	74,354	75,763	35,308	49,799	134,670	1,222

Bureau of Agricultural Economics. Compiled from Foreign Commerce and Navigation of the United States, 1900-1918, and Monthly Summary of Foreign Commerce of the United States, June issues 1921-1931.

Conversion factors used: Corn meal, 1 barrel=4 bushels corn; oatmeal, 18 pounds=1 bushel oats; rye flour, 1 barrel=6 bushels rye; malt, 1.1 bushels=1 bushel barley; wheat flour, 1 barrel=1900-1908, 4.75 bushels grain; 1909-1917, 4.7 bushels; 1918 and 1919, 4.5 bushels; 1920, 4.6 bushels; 1921-1931, 4.7 bushels. Apples, 3 boxes=1 barrel.

<sup>1</sup> Includes canned, fresh, salted, or pickled pork, lard, neutral lard, lard oil, bacon, and hams.

<sup>2</sup> Reported in value only.

<sup>3</sup> Preliminary.

<sup>4</sup> Includes canned, cured, and fresh beef, oleo oil, oleo stock, oleomargarine, tallow, and stearin from animal fats.

<sup>5</sup> Bales of 500 pounds gross; lint cotton and lintens not separately reported prior to 1915.

<sup>6</sup> Includes maple sugar, 1919-1931.

<sup>7</sup> Includes barley flour 1919-1922. Barley flour not separately reported prior to 1919 nor since 1922.

<sup>8</sup> Includes "Stems, trimmings, and scrap tobacco."

<sup>9</sup> Included with "Starch" prior to 1918.

<sup>10</sup> Given in value only prior to 1923.

<sup>11</sup> Jan. 1 to June 30.

TABLE 442.—Imports of selected agricultural products, averages 1899-1900 to 1908-09, annual 1909-10 to 1930-31

Year beginning July—	Butter	Cheese	Beef and veal, fresh	Cattle hides	Goat-skins	Total hides and skins (except furs)	Silk <sup>1</sup>	Cotton, unmanufactured	Wool, unmanufactured, including mohair, etc.	Total, tobacco, unmanufactured
Average: 1899-1900 to 1903-4	1,000 pounds 192	1,000 pounds 17,840	1,000 pounds (°)	1,000 pounds 131,736	1,000 pounds 83,047	1,000 pounds 308,300	1,000 pounds 13,042	1,000 pounds 67,292	1,000 pounds 155,394	1,000 pounds 28,216
1904-5 to 1908-9	532	30,462	(°)	138,922	95,555	372,292	20,061	78,771	206,413	38,688
1909-10	1,300	40,818	(°)	318,004	115,845	608,619	23,457	86,038	203,928	46,853
1910-11	1,008	45,569	(°)	150,128	86,914	374,891	26,666	113,768	137,648	43,203
1911-12	1,026	46,542	(°)	251,012	95,341	537,768	26,585	109,780	193,401	54,740
1912-13	1,162	49,388	(°)	288,042	96,250	572,197	32,101	121,852	195,288	67,977
1913-14	7,842	63,784	180,137	279,963	84,759	561,071	34,546	123,347	247,649	61,175
1914-15	3,828	50,139	184,491	344,341	66,547	538,218	31,053	185,205	308,083	45,809
1915-16	713	30,088	171,102	434,178	100,687	561,071	41,925	232,801	534,828	43,078
1916-17	524	14,482	15,217	386,600	105,640	700,207	40,351	147,062	372,372	49,105
1917-18	1,806	9,839	25,452	207,500	66,933	432,517	43,681	103,326	379,130	86,991
1918-19	4,131	2,442	36,070	253,877	89,005	445,142	50,069	103,592	422,415	83,951
1919-20	20,771	17,914	42,436	439,461	126,906	708,599	58,410	345,314	427,578	94,005
1920-21	34,344	16,585	41,956	198,573	41,728	352,193	34,778	125,989	318,236	58,223
1921-22	9,551	24,271	28,001	204,986	83,636	392,904	57,437	179,165	255,087	65,225
1922-23	15,772	54,555	32,481	405,383	89,401	682,893	63,188	238,092	526,473	75,786
1923-24	29,466	66,597	25,144	176,475	65,881	365,194	56,595	148,024	239,122	54,977
1924-25	7,189	61,489	12,419	199,310	65,956	387,447	70,270	155,092	284,706	70,870
1925-26	6,440	62,412	18,279	155,587	86,484	355,266	76,838	161,454	345,512	60,974
1926-27	10,710	89,782	22,098	156,938	83,571	368,876	85,162	190,963	271,128	92,983
1927-28	4,955	75,424	47,650	307,362	84,751	532,379	87,128	175,450	248,035	81,045
1928-29	3,299	84,006	62,481	216,348	94,486	447,384	90,662	227,454	270,937	79,284
1929-30	2,851	78,261	30,190	294,832	101,120	548,567	87,408	197,657	220,476	63,181
1930-31 <sup>2</sup>	1,329	57,972	3,551	91,107	80,830	265,936	87,861	51,192	149,557	75,426

Year beginning July—	Rubber and similar gums, crude, total	Coffee	Tea	Cocoa or cacao beans	Bananas	Olives	Lemons	Onions	Tomatoes, fresh	Beans, dry
Average: 1899-1900 to 1903-4	1,000 pounds 66,973	1,000 pounds 928,799	1,000 pounds 94,342	1,000 pounds 54,936	1,000 bunches (°)	1,000 gallons (°)	1,000 boxes 2,153	1,000 bushels 843	1,000 pounds (°)	1,000 bushels 1,002
1904-5 to 1908-9	95,054	965,058	98,353	91,774	536,088	2,796	2,025	941	(°)	1,270
1909-10	154,621	871,470	85,026	108,008	38,157	4,555	2,165	1,024	(°)	1,015
1910-11	145,744	875,367	102,564	138,058	44,099	3,045	1,824	1,615	(°)	1,037
1911-12	175,966	886,201	101,407	145,969	44,521	5,077	1,908	1,436	(°)	1,005
1912-13	170,747	863,131	94,813	140,039	42,357	3,946	2,040	1,489	(°)	1,048
1913-14	161,777	1,001,825	91,131	170,268	48,084	5,316	(°)	1,115	(°)	1,034
1914-15	196,122	1,118,691	96,988	192,307	41,092	3,622	(°)	829	(°)	992
1915-16	304,183	1,201,104	109,086	243,232	36,755	5,938	(°)	716	(°)	663
1916-17	364,914	1,319,871	103,364	338,654	34,061	5,642	(°)	1,768	(°)	3,748
1917-18	414,984	1,143,891	151,315	399,040	34,550	2,385	(°)	1,112	(°)	4,146
1918-19	422,215	1,046,029	108,172	313,037	35,382	3,501	(°)	1,313	(°)	4,016
1919-20	600,010	1,414,228	97,826	420,331	36,848	5,206	(°)	1,884	(°)	3,804
1920-21	871,300	1,348,928	72,106	327,123	40,808	4,054	(°)	689	(°)	826
1921-22	578,512	1,238,012	86,142	317,124	46,120	(°)	1,373	2,488	(°)	520
1922-23	810,028	1,305,188	96,669	381,508	44,504	(°)	1,680	1,783	(°)	2,623
1923-24	633,489	1,429,617	105,443	382,971	44,935	6,848	1,018	1,406	760,838	886
1924-25	824,434	1,279,570	92,779	382,570	50,513	5,901	1,264	2,075	66,216	1,421
1925-26	962,659	1,437,364	99,411	417,060	58,550	5,992	1,247	2,194	82,448	1,271
1926-27	993,272	1,444,847	97,402	425,184	57,102	5,212	659	2,298	124,489	1,051
1927-28	959,245	1,535,392	90,099	411,543	64,029	6,458	1,398	1,399	113,357	2,465
1928-29	1,252,130	1,435,070	92,635	419,243	63,530	6,955	391	2,050	128,627	1,505
1929-30	1,167,817	1,562,058	86,368	421,988	65,909	8,452	1,229	918	139,886	2,534
1930-31 <sup>2</sup>	1,048,768	1,728,569	87,148	415,442	57,841	7,429	350	214	113,480	1,346

Footnotes at end of table.

TABLE 442.—Imports of selected agricultural products, averages 1899-1900 to 1908-9, annual 1909-10 to 1930-31—Continued

Year beginning July—	Almonds in terms of shelled <sup>a</sup>	Peanuts in terms of shelled <sup>a</sup>	Walnuts in terms of shelled <sup>a</sup>	Coco-nut meat <sup>a</sup>	Flax-seed	Sugar, raw and refined	Molasses	Jute and jute butts, unmanufactured	Manilla or abaca	Sisal and henequen
Average:	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 bushels	1,000 short tons	1,000 gallons	1,000 long tons	1,000 long tons	1,000 long tons
1899-1900 to 1903-4.....	7,862	( <sup>10</sup> )	18,017	( <sup>10</sup> )	504	1,894	13,788	102	54	87
1904-5 to 1908-9.....	13,832	( <sup>10</sup> )	28,849	*15,010	218	1,961	20,221	114	58	98
1909-10.....	18,556	29,270	33,641	21,306	5,002	2,047	31,292	68	93	100
1910-11.....	15,523	18,834	33,619	37,817	10,499	1,969	23,838	65	74	118
1911-12.....	17,231	11,248	37,214	69,912	6,842	2,052	28,828	101	69	114
1912-13.....	13,856	14,989	17,213	40,870	5,294	2,370	33,927	125	74	154
1913-14.....	15,027	38,726	20,800	55,735	8,653	2,533	51,410	106	50	216
1914-15.....	13,679	19,338	20,490	96,485	10,666	2,710	70,840	83	51	186
1915-16.....	14,546	25,407	23,738	118,613	14,679	2,817	85,717	108	79	229
1916-17.....	19,916	32,385	23,839	256,801	12,394	2,666	110,238	113	77	143
1917-18.....	20,845	75,463	16,252	507,576	13,367	2,452	130,731	78	86	150
1918-19.....	25,615	20,425	9,087	315,749	8,427	2,918	130,075	53	68	153
1919-20.....	28,533	123,390	28,061	258,229	23,392	3,798	154,670	77	77	176
1920-21.....	15,861	46,202	15,902	213,134	16,170	3,506	113,414	90	52	159
1921-22.....	28,036	9,678	35,174	294,104	13,632	4,322	87,908	62	44	72
1922-23.....	24,345	45,013	25,970	338,597	25,006	4,367	161,135	85	98	98
1923-24.....	24,207	50,683	26,428	344,920	19,577	3,765	174,037	84	98	97
1924-25.....	22,503	93,191	36,623	371,961	13,419	3,377	215,778	56	73	140
1925-26.....	19,686	36,026	31,698	444,278	19,354	4,420	286,246	71	62	126
1926-27.....	15,800	49,792	31,776	507,136	24,224	4,420	260,259	89	61	116
1927-28.....	18,496	63,783	20,347	518,173	18,112	4,045	248,427	81	48	124
1928-29.....	18,673	30,412	24,500	687,121	23,494	4,763	296,550	92	60	135
1929-30.....	19,950	9,941	20,228	546,888	19,652	3,641	253,114	80	73	113
1930-31 <sup>1</sup> .....	13,264	9,002	17,818	606,087	7,813	3,288	217,001	49	43	84

Year beginning July—	Milk and cream, fresh	Cream, fresh	Eggs, whole, in the shell	Eggs and egg yolks, dried, frozen, or prepared	Whole eggs, dried	Whole eggs, frozen	Yolks, dried	Yolks, frozen	Egg albumen, dried	Egg albumen, frozen, prepared and preserved	Hair of the Angora (mohair)
	1,000 gallons	1,000 gallons	1,000 dozen	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
1912-13.....	( <sup>9</sup> )	1,247	1,367	228	—	—	—	—	( <sup>9</sup> )	—	—
1913-14.....	( <sup>9</sup> )	1,773	6,015	3,490	—	—	—	—	( <sup>9</sup> )	—	—
1914-15.....	( <sup>9</sup> )	2,077	3,047	8,572	—	—	—	—	( <sup>9</sup> )	—	—
1915-16.....	( <sup>9</sup> )	1,194	3,733	6,022	—	—	—	—	( <sup>9</sup> )	—	—
1916-17.....	( <sup>9</sup> )	744	1,110	10,318	—	—	—	—	( <sup>9</sup> )	—	—
1917-18.....	( <sup>9</sup> )	712	1,619	14,598	—	—	—	—	( <sup>9</sup> )	—	—
1918-19.....	2,592	( <sup>9</sup> )	1,848	9,085	—	—	—	—	( <sup>9</sup> )	—	—
1919-20.....	3,989	( <sup>9</sup> )	1,348	24,061	—	—	—	—	( <sup>9</sup> )	—	—
1920-21.....	4,391	( <sup>9</sup> )	3,316	28,768	—	—	—	—	( <sup>9</sup> )	—	—
1921-22.....	4,536	( <sup>9</sup> )	1,224	16,540	—	—	—	—	( <sup>9</sup> )	—	—
1922-23.....	5,148	( <sup>9</sup> )	535	14,821	—	—	—	—	7,388	—	—
1923-24.....	6,623	71,646	426	14,830	7,544	71,106	7,522	71,210	6,642	7,220	3,583
1924-25.....	6,418	4,765	682	—	1,884	8,751	4,281	4,151	3,267	1,106	2,404
1925-26.....	7,479	4,798	276	—	1,365	12,647	6,004	5,662	4,490	5,119	6,403
1926-27.....	6,106	5,273	296	—	1,132	8,114	4,468	4,601	3,859	3,947	6,547
1927-28.....	5,425	4,819	256	—	—	611	3,496	1,229	2,361	553	2,204
1928-29.....	5,010	3,173	291	—	2,133	12,616	5,130	4,551	2,898	610	3,134
1929-30.....	3,314	2,474	337	—	1,839	9,824	7,819	3,475	4,363	9,955	1,073
1930-31 <sup>1</sup> .....	1,190	844	301	—	822	113	6,069	1,052	2,219	2	474

Bureau of Agricultural Economics. Compiled from Commerce and Navigation of the United States 1900-1918, and Monthly Summary of Foreign Commerce, June issue, 1919-1931.

<sup>1</sup> Includes "Silk, raw or as reeled from cocoon," "Silk waste," and "Silk cocoons."

<sup>2</sup> Not separately classified.

<sup>3</sup> Preliminary.

<sup>4</sup> Reported in value only.

<sup>5</sup> 2-year average.

<sup>6</sup> 3-year average.

<sup>7</sup> Beginning Jan. 1, 1924.

<sup>8</sup> Conversion factors used: Almonds, 30 per cent unshelled equals shelled. Peanuts, 3 pounds unshelled equals 2 pounds shelled. Walnuts, 42 per cent unshelled equals shelled.

<sup>9</sup> Includes broken, or shredded, desiccated or prepared and copra.

<sup>10</sup> Included with "All other nuts."

<sup>11</sup> Beginning Sept. 22, 1922.

<sup>12</sup> July 1-Dec. 31, 1923.

TABLE 443.—*Destination of principal agricultural products exported from the United States, 1927-28 to 1930-31*

Article and country to which exported	Year beginning July							
	Quantity				Per cent of total			
	1927-28	1928-29	1929-30	1930-31 <sup>1</sup>	1927-28	1928-29	1929-30	1930-31 <sup>1</sup>
<b>ANIMALS AND ANIMAL PRODUCTS</b>								
<b>Butter:</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
Mexico.....	724	672	617	428	18.3	18.0	17.2	18.4
Cuba.....	479	370	96	6	12.1	9.8	2.7	.3
Haiti, Republic of.....	479	479	458	394	12.1	12.7	12.8	17.0
Other West Indies <sup>1</sup> .....	391	394	380	261	9.9	10.4	10.6	11.3
Peru.....	358	451	371	67	9.0	11.9	10.4	2.9
Other South America.....	390	485	492	351	9.8	12.8	13.7	15.2
Panama.....	311	227	342	157	7.8	6.0	9.5	6.8
Philippine Islands.....	190	152	210	154	4.8	4.0	5.9	6.6
Other countries.....	643	548	616	500	16.2	14.4	17.2	21.5
Total.....	3,985	3,778	3,582	2,316	100.0	100.0	100.0	100.0
<b>Cheese:</b>								
Mexico.....	581	423	506	293	20.2	10.4	21.6	16.9
Panama.....	432	480	485	442	15.0	17.9	20.7	25.5
Other Central America.....	293	294	289	233	10.2	11.4	12.4	13.4
Cuba.....	359	405	170	72	12.5	15.7	7.3	4.2
Other West Indies <sup>1</sup> .....	331	360	252	207	11.5	14.0	10.8	11.9
Canada.....	239	170	176	179	9.0	6.6	7.5	10.3
China.....	145	89	45	29	5.0	3.5	1.9	1.7
Other countries.....	473	371	416	278	16.6	14.5	17.8	26.1
Total.....	2,873	2,572	2,389	1,733	100.0	100.0	100.0	100.0
<b>Milk:</b>								
<b>Condensed—</b>								
Total Europe.....	151	70	21	14	.4	.2	.1	.1
Cuba.....	11,462	13,103	13,196	3,651	31.0	33.1	34.9	15.9
Philippine Islands.....	7,575	7,339	7,347	7,666	20.5	18.5	19.5	33.0
Japan.....	5,385	5,473	4,701	4,167	14.6	13.8	12.4	18.2
Hong Kong.....	3,764	3,739	3,905	2,372	10.2	9.5	10.3	10.3
China.....	2,513	2,840	2,173	1,319	6.8	7.2	5.8	5.8
Mexico.....	985	883	1,055	605	2.7	2.2	2.8	2.6
Other countries.....	5,140	6,118	5,373	3,240	13.8	15.5	14.2	14.1
Total.....	36,975	39,565	37,771	22,934	100.0	100.0	100.0	100.0
<b>Evaporated—</b>								
United Kingdom.....	23,805	21,789	11,877	15,978	33.1	29.9	18.6	28.5
Belgium.....	389	265	25	11	.5	.4	0	0
Germany.....	16	71	11	69	0	.1	0	.1
Other Europe.....	191	172	421	287	.3	.1	.7	.6
Total Europe.....	24,401	22,267	12,334	16,345	33.9	30.5	19.3	20.2
Philippine Islands.....	15,563	16,372	17,163	18,684	21.6	22.5	26.9	33.8
Panama.....	3,589	4,606	4,805	2,898	5.0	6.3	7.5	5.2
Peru.....	3,569	4,027	3,602	1,583	5.0	8.5	5.6	2.8
China.....	3,035	3,447	2,056	816	4.2	4.7	3.2	1.5
British Malaya.....	2,817	2,761	3,359	1,028	3.9	3.8	5.3	1.8
Cuba.....	2,847	2,272	2,335	486	3.7	3.1	4.6	.9
Japan.....	2,466	2,544	2,735	2,867	3.4	3.5	4.4	5.1
Mexico.....	2,157	2,185	2,274	1,296	3.0	3.0	3.6	2.3
Other countries.....	11,724	12,413	12,498	10,051	16.3	17.1	19.6	17.9
Total.....	71,968	72,894	63,801	56,052	100.0	100.0	100.0	100.0
<b>Bacon, including Cumberland sides:</b>								
United Kingdom.....	50,127	53,364	57,443	26,208	39.5	41.3	43.2	50.0
Germany.....	9,838	5,582	8,488	1,151	7.7	4.6	6.4	2.2
Italy.....	8,113	15,100	8,289	764	6.4	11.7	6.2	1.5
Finland.....	6,076	4,633	3,784	1,540	4.8	3.6	2.8	3.0
Norway.....	3,244	2,742	2,642	712	2.6	2.1	2.0	1.4
Netherlands.....	632	1,198	2,950	61	.5	.9	2.2	.1
Other Europe.....	21,525	20,210	22,854	4,972	16.9	15.7	17.2	9.4
Total Europe.....	99,554	103,235	106,389	35,412	78.4	79.9	80.0	67.6
Cuba.....	19,107	16,698	17,253	12,398	15.0	12.9	13.0	23.7
Canada.....	5,173	5,769	5,617	2,335	4.1	4.5	4.2	4.5
Other countries.....	3,133	3,546	3,708	2,267	2.5	2.7	2.8	4.2
Total.....	126,967	129,248	132,967	52,412	100.0	100.0	100.0	100.0

<sup>1</sup> Preliminary.<sup>2</sup> Excludes Bermuda.

TABLE 443.—*Destination of principal agricultural products exported from the United States, 1927-28 to 1930-31—Continued*

Article and country to which exported	Year beginning July							
	Quantity				Per cent of total			
	1927-28	1928-29	1929-30	1930-31	1927-28	1928-29	1929-30	1930-31
<b>ANIMALS AND ANIMAL PRODUCTS—continued</b>								
<b>Hams and shoulders, including</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
Witshire sides:								
United Kingdom.....	104,020	100,959	103,189	81,294	81.4	80.5	79.2	81.5
Belgium.....	980	1,003	2,138	1,464	.5	.8	1.6	1.5
Other Europe.....	1,846	2,024	1,155	236	1.4	1.6	.9	.2
<b>Total Europe.....</b>	<b>106,526</b>	<b>103,986</b>	<b>106,480</b>	<b>82,994</b>	<b>83.3</b>	<b>82.9</b>	<b>81.7</b>	<b>83.2</b>
Cuba.....	8,167	7,435	5,083	4,272	6.4	5.9	3.9	4.3
Canada.....	6,134	6,309	11,370	5,805	4.8	5.0	8.7	5.9
Other countries.....	6,992	7,666	7,435	6,588	5.5	6.2	5.7	6.6
<b>Total.....</b>	<b>127,819</b>	<b>125,396</b>	<b>130,313</b>	<b>99,749</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Pork:</b>								
<b>Canned—</b>								
United Kingdom.....	7,632	6,555	10,737	9,066	88.6	82.2	84.0	85.9
Other Europe.....	97	145	238	193	1.1	1.8	1.9	1.8
<b>Total Europe.....</b>	<b>7,729</b>	<b>6,700</b>	<b>10,975</b>	<b>9,259</b>	<b>89.7</b>	<b>84.0</b>	<b>85.9</b>	<b>87.7</b>
Other countries.....	885	1,274	1,808	1,293	10.3	16.0	14.1	12.3
<b>Total.....</b>	<b>8,614</b>	<b>7,974</b>	<b>12,783</b>	<b>10,552</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Fresh—</b>								
United Kingdom.....	6,418	4,547	10,527	8,098	58.0	42.7	56.1	73.0
Other Europe.....	1,002	2,515	3,685	464	9.1	23.7	19.6	4.2
<b>Total Europe.....</b>	<b>7,420</b>	<b>7,062</b>	<b>14,212</b>	<b>8,562</b>	<b>67.1</b>	<b>66.4</b>	<b>75.7</b>	<b>77.2</b>
Cuba.....	1,557	1,732	1,618	424	14.1	16.3	8.6	3.5
Canada.....	798	582	1,091	410	7.2	5.5	5.8	3.7
Other countries.....	1,284	1,265	1,847	1,697	11.6	11.8	9.9	15.3
<b>Total.....</b>	<b>11,059</b>	<b>10,641</b>	<b>18,768</b>	<b>11,093</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Pickled—</b>								
United Kingdom.....	5,184	7,608	5,094	2,945	16.4	19.1	12.8	13.9
Norway.....	722	854	799	364	2.3	2.1	2.0	1.7
Germany.....	269	366	328	89	.9	.9	.8	.4
Other Europe.....	821	1,420	1,194	327	2.6	3.6	3.0	1.6
<b>Total Europe.....</b>	<b>7,016</b>	<b>10,248</b>	<b>7,415</b>	<b>3,725</b>	<b>22.2</b>	<b>25.7</b>	<b>18.6</b>	<b>17.6</b>
Cuba.....	7,626	10,550	9,774	4,862	21.1	26.4	24.6	23.0
Canada.....	7,056	8,596	11,211	4,356	22.3	21.5	28.2	20.6
Newfoundland and Labrador.....	8,734	4,530	4,792	3,681	11.8	11.4	12.0	17.4
British West Indies and Bermudas.....	2,851	2,810	221	2,220	9.0	7.0	.6	10.5
Haiti, Republic of.....	1,055	838	719	544	3.3	2.1	1.8	2.6
Other countries.....	2,312	2,334	5,677	1,724	7.3	5.9	14.2	8.3
<b>Total.....</b>	<b>31,650</b>	<b>39,906</b>	<b>39,800</b>	<b>21,118</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Lard:</b>								
United Kingdom.....	233,564	229,899	240,147	250,353	32.6	29.4	30.5	43.8
Germany.....	176,771	195,695	180,074	107,317	24.7	25.1	22.9	18.3
Netherlands.....	35,784	36,902	48,594	26,478	5.0	4.7	4.2	4.5
Italy.....	20,384	29,200	19,855	6,064	2.8	3.7	2.5	1.0
Belgium.....	14,541	14,841	18,700	9,406	2.0	1.0	2.4	1.6
Other Europe.....	38,144	49,070	56,631	14,701	5.4	6.4	7.1	2.6
<b>Total Europe.....</b>	<b>519,188</b>	<b>555,697</b>	<b>583,401</b>	<b>420,409</b>	<b>72.5</b>	<b>71.2</b>	<b>71.6</b>	<b>71.8</b>
Cuba.....	78,469	84,316	79,890	49,004	11.0	10.8	10.1	8.4
Other countries.....	118,741	140,901	143,899	116,257	16.5	18.0	18.3	19.8
<b>Total.....</b>	<b>716,398</b>	<b>780,914</b>	<b>787,180</b>	<b>585,670</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

TABLE 443.—*Destination of principal agricultural products exported from the United States, 1927-28 to 1930-31—Continued*

Article and country to which exported	Year beginning July							
	Quantity				Per cent of total			
	1927-28	1928-29	1929-30	1930-31	1927-28	1928-29	1929-30	1930-31
<b>ANIMAL AND ANIMAL PRODUCTS—continued</b>								
Lard, neutral:	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	Per cent	Per cent	Per cent	Per cent
Netherlands.....	6,784	4,710	6,280	3,264	28.5	25.7	37.3	30.3
Germany.....	5,623	4,023	3,010	1,421	23.6	22.0	17.9	13.2
United Kingdom.....	5,066	3,919	2,320	1,526	21.4	21.4	13.8	14.2
Norway.....	1,228	895	755	529	5.2	4.9	4.5	4.9
Denmark.....	1,176	804	1,379	1,453	4.9	4.9	8.2	13.5
Sweden.....	696	649	787	768	2.9	3.5	4.7	7.1
Other Europe.....	1,206	1,463	1,197	1,015	5.1	8.0	7.2	9.5
Total Europe.....	21,809	16,553	15,708	9,974	91.6	90.4	93.6	92.7
Other countries.....	1,990	1,762	1,075	785	8.4	9.6	6.4	7.3
Total.....	23,799	18,315	16,783	10,759	100.0	100.0	100.0	100.0
Oleo oil:								
Germany.....	18,267	16,835	14,630	13,934	28.2	26.6	23.9	25.4
Netherlands.....	17,608	16,744	22,158	15,868	27.2	26.5	36.3	28.9
United Kingdom.....	16,092	16,328	11,735	13,179	24.8	25.8	19.2	24.0
Norway.....	3,596	2,703	2,549	2,018	5.5	4.4	4.2	3.7
Greece.....	454	602	750	1,687	.7	1.0	1.2	2.9
Other Europe.....	5,594	6,209	6,218	6,053	8.6	9.8	10.2	10.9
Total Europe.....	61,611	59,481	58,040	52,639	95.0	94.1	95.0	95.8
Other countries.....	3,240	3,706	3,048	2,322	5.0	5.9	5.0	4.2
Total.....	64,851	63,187	61,088	54,961	100.0	100.0	100.0	100.0
<b>VEGETABLE PRODUCTS</b>								
Cotton, excluding linters:	1,000 bales <sup>1</sup>	1,000 bales <sup>1</sup>	1,000 bales <sup>1</sup>	1,000 bales <sup>1</sup>				
Germany.....	2,090	1,891	1,770	1,752	26.5	22.2	24.0	24.9
United Kingdom.....	1,443	1,918	1,806	1,108	18.3	22.5	18.4	15.7
France.....	904	841	860	986	11.5	9.9	12.1	14.0
Italy.....	708	765	705	495	9.0	9.0	9.9	7.0
Other Europe.....	1,283	1,183	926	772	16.2	13.8	13.2	10.9
Total Europe.....	6,428	6,598	5,567	5,113	81.5	77.4	78.5	72.5
Japan.....	1,007	1,373	1,071	1,233	12.8	16.1	15.1	17.5
Other countries.....	455	549	458	702	5.7	6.5	6.4	10.0
Total.....	7,890	8,520	7,096	7,048	100.0	100.0	100.0	100.0
Linters:								
Germany.....	132	120	70	56	57.1	54.8	49.0	42.4
France.....	36	32	26	27	15.6	14.6	18.2	20.5
United Kingdom.....	22	16	7	11	9.5	7.3	4.9	8.3
Belgium.....	7	12	8	5	3.0	5.5	5.6	3.8
Other Europe.....	15	18	14	14	6.6	8.2	9.7	10.6
Total Europe.....	212	198	125	113	91.8	90.4	87.4	85.6
Canada.....	18	19	17	16	7.8	8.7	11.9	12.1
Other countries.....	1	2	1	3	.4	.9	.7	2.3
Total.....	231	219	143	132	100.0	100.0	100.0	100.0
<b>Fruits:</b>								
Dried—								
Apples—	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds				
Germany.....	10,877	22,085	11,425	18,470	50.1	44.1	48.1	48.5
Netherlands.....	3,315	12,451	4,323	8,763	15.3	24.9	18.2	23.0
Sweden.....	2,524	2,985	3,015	1,846	11.6	6.0	12.7	4.8
Denmark.....	1,384	1,074	894	1,161	6.4	3.3	3.8	3.0
United Kingdom.....	1,018	2,618	1,522	1,755	4.7	5.2	6.4	4.6
Other Europe.....	1,617	6,995	1,880	5,598	7.4	14.1	7.8	14.7
Total Europe.....	20,735	48,808	23,059	37,593	95.5	97.6	97.0	98.6
Other countries.....	969	1,216	710	528	4.5	2.4	3.0	1.4
Total.....	21,704	50,024	23,769	38,121	100.0	100.0	100.0	100.0

<sup>1</sup> Bales of 500 pounds.

TABLE 443.—*Destination of principal agricultural products exported from the United States, 1927-28 to 1930-31—Continued*

Article and country to which exported	Year beginning July							
	Quantity				Per cent of total			
	1927-28	1928-29	1929-30	1930-31	1927-28	1928-29	1929-30	1930-31
<b>VEGETABLE PRODUCTS—continued</b>								
<b>Fruits—Continued.</b>								
<b>Dried—Continued.</b>								
<b>Apricots—</b>								
Germany.....	1,000 6,512	1,000 7,742	1,000 6,091	1,000 8,695	Per cent 27.5	Per cent 31.4	Per cent 31.4	Per cent 30.8
Netherlands.....	4,651	3,750	2,493	2,933	19.6	15.2	13.1	12.4
United Kingdom.....	1,964	1,422	1,019	1,243	8.3	5.8	5.3	5.3
Belgium.....	1,574	1,691	891	1,032	5.8	6.9	4.7	8.2
Norway.....	1,360	985	1,327	786	5.3	4.0	6.0	3.3
Sweden.....	994	776	939	835	4.2	3.1	4.9	3.5
Other Europe.....	4,408	5,910	4,104	5,808	18.6	21.0	21.5	23.5
Total Europe.....	21,158	22,279	16,864	21,992	80.3	90.4	88.3	93.0
Canada.....	1,920	1,614	1,431	1,036	8.1	6.5	7.5	4.4
Other countries.....	606	759	806	619	2.6	3.1	4.2	2.6
Total.....	23,684	24,652	19,101	23,647	100.0	100.0	100.0	100.0
<b>Prunes:</b>								
Germany.....	79,732	77,883	44,780	97,631	30.6	28.5	31.3	33.0
United Kingdom.....	45,601	40,836	28,143	39,824	17.5	15.0	19.7	13.4
France.....	27,390	59,822	9,298	46,671	10.5	21.9	6.5	15.7
Netherlands.....	23,140	17,286	5,584	18,903	8.9	6.3	3.9	6.4
Sweden.....	7,047	5,434	6,744	8,712	2.7	2.0	4.7	2.0
Other Europe.....	40,664	39,533	22,200	56,174	15.6	14.5	15.6	10.0
Total Europe.....	223,574	240,704	116,857	267,815	85.8	88.2	81.7	90.4
Canada.....	22,272	18,965	16,187	16,456	8.9	6.9	11.3	5.6
Other countries.....	13,779	13,292	9,945	11,983	5.3	4.9	7.0	4.0
Total.....	260,625	273,051	142,989	296,254	100.0	100.0	100.0	100.0
<b>Raisins:</b>								
United Kingdom.....	70,034	71,375	36,443	40,293	36.3	32.2	28.3	32.2
Germany.....	18,733	23,023	14,059	14,628	9.7	10.4	10.9	11.7
Netherlands.....	18,598	24,278	7,436	8,827	9.6	10.9	5.8	7.1
Denmark.....	1,593	2,244	1,286	1,385	0.8	1.0	1.0	1.1
Other Europe.....	22,967	31,866	18,391	19,807	11.9	14.4	14.3	15.8
Total Europe.....	131,925	152,785	77,615	84,940	68.3	68.9	60.3	67.9
Canada.....	40,148	39,035	28,668	22,804	20.8	17.9	22.3	18.3
China.....	4,144	7,574	4,701	1,816	2.1	3.4	3.7	1.5
Japan.....	3,086	2,961	2,992	2,140	1.6	1.3	2.3	1.7
Other countries.....	13,796	18,801	14,631	13,310	7.2	8.5	11.4	10.6
Total.....	193,099	221,756	128,097	125,100	100.0	100.0	100.0	100.0
<b>Fresh—</b>								
<b>Apples—</b>								
United Kingdom.....	1,000 1,004	1,000 1,720	1,000 953	1,000 964	74.4	57.2	66.8	38.5
Germany.....	27	236	50	404	2.0	7.9	3.5	16.3
Netherlands.....	2	201	17	334	.2	6.7	1.2	13.5
Belgium.....	1	321	14	313	.1	10.7	1.0	12.6
Other Europe.....	150	308	175	263	11.1	10.2	12.2	10.6
Total Europe.....	1,184	2,786	1,209	2,268	87.8	92.7	84.7	91.5
Other countries.....	165	219	218	211	12.2	7.3	15.3	8.5
Total.....	1,349	3,005	1,427	2,479	100.0	100.0	100.0	100.0
<b>Apples—</b>								
United Kingdom.....	1,000 2,709	1,000 4,836	1,000 2,655	1,000 3,091	50.3	40.2	44.3	30.9
Germany.....	737	2,695	946	3,476	13.7	22.4	15.8	26.9
Netherlands.....	72	1,687	272	2,417	1.3	14.0	4.5	18.7
Other Europe.....	507	839	598	1,501	9.5	7.0	9.9	11.7
Total Europe.....	4,025	10,057	4,471	11,385	74.8	83.6	74.5	88.2
Canada.....	542	636	500	475	10.1	5.3	8.3	3.7
Other countries.....	817	1,333	1,027	1,044	15.1	11.1	17.2	8.1
Total.....	5,384	12,026	5,998	12,904	100.0	100.0	100.0	100.0

TABLE 443.—*Destination of principal agricultural products exported from the United States, 1927-28 to 1930-31—Continued*

Article and country to which exported	Quantity							
	Quantity				Per cent of total			
	1927-28	1928-29	1929-30	1930-31	1927-28	1928-29	1929-30	1930-31
<b>VEGETABLE PRODUCTS—continued</b>								
<b>Fruits—Continued.</b>								
<b>Fresh—Continued.</b>								
Oranges—	<i>1,000 boxes</i>	<i>1,000 boxes</i>	<i>1,000 boxes</i>	<i>1,000 boxes</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
United Kingdom.....	402	709	796	669	13.5	16.8	21.7	16.8
Canada.....	2,346	3,151	2,568	2,873	78.5	74.6	69.9	72.1
Other countries.....	240	363	310	442	8.0	8.6	8.4	11.1
Total.....	2,988	4,223	3,674	3,984	100.0	100.0	100.0	100.0
Grapefruit—								
United Kingdom.....	333	561	496	741	46.3	59.7	58.1	60.6
Canada.....	349	335	308	408	48.5	35.6	36.1	33.4
Germany.....	6	8	10	23	.8	.9	1.2	1.9
France.....	4	4	5	7	.6	.4	.6	.6
Other countries.....	27	32	35	43	3.8	3.4	4.0	3.5
Total.....	719	940	854	1,222	100.0	100.0	100.0	100.0
<b>Canned—</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>				
United Kingdom.....	177,256	236,754	203,151	215,575	69.3	71.8	71.0	79.5
Other Europe.....	38,539	47,646	40,171	26,667	15.0	14.4	14.2	9.9
Total Europe.....	215,795	284,400	243,322	242,242	84.3	86.2	85.8	89.4
Canada.....	17,993	22,769	20,438	13,693	7.0	6.9	7.2	5.1
Other countries.....	22,088	22,654	19,967	15,161	8.7	6.9	7.0	5.5
Total.....	255,876	329,823	283,717	271,096	100.0	100.0	100.0	100.0
<b>Grains and grain products:</b>								
<b>Barley (grain)—</b>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>				
Germany.....	11,599	13,085	1,521	0	31.7	23.0	7.1	0
United Kingdom.....	10,151	13,161	9,370	8,070	27.8	23.1	43.5	83.4
Netherlands.....	2,581	3,908	479	6	7.1	6.9	2.2	.1
Belgium.....	642	1,732	651	863	1.8	3.1	3.0	8.3
Other Europe.....	634	749	766	537	1.6	1.2	3.5	5.2
Total Europe.....	25,607	32,686	12,777	10,078	70.0	57.3	59.3	97.0
Canada.....	10,453	23,896	8,144	9	28.6	41.9	37.8	.1
Other countries.....	520	424	623	303	1.4	.8	2.9	2.9
Total.....	36,580	56,996	21,544	10,390	100.0	100.0	100.0	100.0
<b>Corn (grain)—</b>								
Netherlands.....	4,311	7,977	126	50	23.5	19.6	1.3	2.0
Germany.....	2,520	4,241	0	09	13.7	10.4	0	2.7
United Kingdom.....	1,846	8,237	20	8	10.8	20.2	.2	.3
Denmark.....	845	896	0	1	4.6	2.2	0	0
Canada.....	6,454	11,082	7,390	1,414	35.1	27.2	79.0	55.9
Cuba.....	1,021	765	226	18	5.6	1.9	2.4	.7
Mexico.....	323	572	1,297	823	1.8	1.4	13.9	32.5
Other countries.....	1,015	6,974	295	146	5.4	17.1	3.2	5.9
Total.....	18,374	40,744	9,354	2,529	100.0	100.0	100.0	100.0
<b>Oats—</b>								
United Kingdom.....	645	1,177	13	0	10.7	10.8	.3	0
Belgium.....	123	257	0	0	2.0	2.4	0	0
Germany.....	115	0	0	0	1.9	0	0	0
France.....	44	141	0	0	.7	1.3	0	0
Other Europe.....	316	1,620	2	0	5.3	15.0	0	0
Total Europe.....	1,243	3,195	15	0	20.6	29.5	.3	0
Canada.....	3,426	6,501	3,913	680	56.8	59.9	84.4	75.0
Cuba.....	1,028	861	490	61	17.0	7.9	10.6	6.7
Mexico.....	98	51	44	35	1.6	.5	.9	3.9
Other countries.....	239	240	173	131	4.0	2.2	3.8	14.4
Total.....	6,034	10,848	4,635	907	100.0	100.0	100.0	100.0

TABLE 443.—*Destination of principal agricultural products exported from the United States, 1927-28 to 1930-31—Continued*

Article and country to which exported	Year beginning July							
	Quantity				Per cent of total			
	1927-28	1928-29	1929-30	1930-31	1927-28	1928-29	1929-30	1930-31
<b>VEGETABLE PRODUCTS—continued</b>								
<b>Grains and grain products—Contd.</b>								
<b>Oatmeal—</b>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
United Kingdom.....	14,447	23,775	8,358	4,533	21.2	21.4	13.9	12.1
Finland.....	9,471	17,335	8,441	4,631	13.9	17.8	14.1	1.1
Netherlands.....	7,485	14,525	7,804	9,479	11.0	14.9	13.0	23.9
Belgium.....	2,850	3,064	801	1,955	4.2	3.2	1.3	4.9
Other Europe.....	5,456	9,249	2,637	1,100	8.0	9.0	4.5	2.8
Total Europe.....	39,749	67,948	28,041	17,858	58.3	69.0	46.8	44.8
South America.....	9,787	11,389	10,431	8,093	14.3	11.7	17.4	20.3
Mexico.....	3,739	3,802	4,064	3,202	5.5	3.9	6.8	8.0
Canada.....	3,582	1,556	5,402	1,046	5.3	1.6	9.0	2.6
British India.....	1,770	1,594	2,013	1,400	2.6	1.6	3.4	3.5
Other countries.....	9,955	10,956	10,012	8,287	14.0	11.3	16.6	20.8
Total.....	63,192	97,245	59,953	39,886	100.0	100.0	100.0	100.0
<b>Rice (grain)—</b>								
Germany.....	35,851	43,799	37,915	34,527	15.0	14.0	16.1	15.4
United Kingdom.....	35,459	41,812	35,854	32,364	15.4	13.3	15.2	14.4
Belgium.....	12,778	23,167	8,959	14,735	5.5	7.4	3.8	6.0
France.....	12,838	16,065	13,419	18,187	5.4	5.1	5.7	8.1
Other Europe.....	37,943	45,274	35,602	42,877	16.2	15.4	15.2	10.0
Total Europe.....	133,819	173,117	131,749	142,690	58.1	55.2	56.0	63.5
South America.....	41,205	78,719	69,297	54,899	17.9	28.1	29.5	24.4
Canada.....	14,227	19,800	18,230	17,842	6.2	6.3	7.8	7.7
Central America.....	5,588	5,852	5,031	4,607	2.6	1.9	2.1	2.1
Japan.....	2,020	14,609	935	878	.9	4.7	.4	.2
Other countries.....	33,273	21,308	9,908	4,633	14.3	6.8	4.2	2.1
Total.....	230,432	313,405	235,159	224,549	100.0	100.0	100.0	100.0
<b>Rye—</b>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>				
United Kingdom.....	1,710	1,174	21	0	6.6	12.6	.8	0
Netherlands.....	1,408	868	0	21	5.4	9.3	0	11.7
Germany.....	1,245	384	21	0	4.8	3.9	.8	0
Denmark.....	468	406	69	48	1.8	4.3	2.7	26.8
Norway.....	298	57	3	0	1.1	.6	.1	0
France.....	145	13	11	17	.6	.1	.4	9.5
Belgium.....	135	9	0	41	.5	.1	0	22.9
Italy.....	0	0	0	40	0	0	0	22.3
Other Europe.....	567	490	17	1	2.1	5.3	.8	.7
Total Europe.....	5,974	3,381	142	168	22.9	36.2	5.6	93.9
Canada.....	20,080	5,913	2,347	0	77.0	63.3	92.5	0
Other countries.....	10	52	49	11	.1	.5	1.9	6.1
Total.....	26,064	9,346	2,538	179	100.0	100.0	100.0	100.0
<b>Wheat—</b>								
United Kingdom.....	26,574	16,276	23,931	17,863	25.1	15.8	26.0	23.4
Netherlands.....	11,559	5,149	0,197	0,943	7.9	5.0	0.7	9.1
Italy.....	10,450	5,047	905	3,675	7.2	4.9	1.0	4.8
Belgium.....	8,797	3,232	6,314	7,308	6.0	3.1	6.9	9.0
Germany.....	5,582	1,674	4,769	1,722	3.8	1.6	5.2	2.3
France.....	5,127	2,215	2,214	7,850	3.5	2.1	2.4	10.3
Other Europe.....	11,114	13,052	12,340	0,516	7.0	12.7	13.3	8.5
Total Europe.....	89,203	46,645	59,679	51,884	61.1	45.2	61.5	68.0
Canada.....	45,563	41,190	16,777	12,493	31.2	39.0	18.2	16.4
Japan.....	6,304	3,782	9,185	3,063	4.3	3.7	10.0	4.0
China.....	0	1,241	140	1,872	0	1.2	0.2	2.5
Other countries.....	4,929	10,256	9,394	6,965	3.4	10.0	10.1	9.1
Total.....	145,999	103,114	92,175	78,277	100.0	100.0	100.0	100.0

TABLE 443.—*Destination of principal agricultural products exported from the United States, 1927-28 to 1930-31—Continued*

Article and country to which exported	Year beginning July							
	Quantity				Per cent of total			
	1927-28	1928-29	1929-30	1930-31	1927-28	1928-29	1929-30	1930-31
<b>VEGETABLE PRODUCTS—continued</b>								
<b>Grains and grain products—Contd.</b>								
Wheat, flour—								
Netherlands.....	1,530	1,084	1,031	1,330	11.9	8.4	7.9	11.3
United Kingdom.....	1,224	886	1,560	1,378	9.5	6.9	12.0	11.7
Germany.....	584	312	452	243	4.2	2.4	3.5	2.1
Greece.....	113	49	30	12	.9	.4	.2	.1
Other Europe.....	1,082	1,377	1,667	1,570	13.2	10.7	12.9	13.4
Total Europe.....	5,093	3,708	4,740	4,533	39.7	28.8	38.5	33.6
Cuba.....	1,216	1,204	1,199	968	9.5	9.3	9.2	8.2
Hong Kong.....	929	868	752	843	7.2	6.7	5.8	7.2
Brazil.....	873	831	780	671	6.8	6.4	6.0	5.7
China.....	790	1,242	553	1,000	6.2	9.6	4.3	8.5
Philippine Islands.....	727	802	730	640	5.7	6.2	5.6	5.4
Central America.....	697	752	684	658	5.4	5.8	5.3	5.6
Other West Indies <sup>1</sup> .....	676	809	663	589	5.3	6.3	5.1	5.0
Kwantung.....	136	428	891	382	1.1	3.3	6.9	3.2
Other countries.....	1,084	2,244	2,002	1,473	13.1	17.6	15.3	12.6
Total.....	12,821	12,888	12,994	11,757	100.0	100.0	100.0	100.0
<b>Hops—</b>								
United Kingdom.....	6,121	4,175	3,255	2,745	51.8	47.2	47.9	49.1
Belgium.....	255	129	98	77	2.2	1.5	1.4	1.4
Other Europe.....	1,342	1,033	653	906	11.3	11.7	9.6	16.2
Total Europe.....	7,718	5,337	4,001	3,728	65.3	60.4	58.9	66.7
Canada.....	3,168	2,838	2,522	1,685	26.8	32.1	37.1	30.1
Other countries.....	926	661	270	180	7.9	7.5	4.0	3.2
Total.....	11,812	8,836	6,793	5,593	100.0	100.0	100.0	100.0
<b>Oil cake and oil-cake meal—</b>								
<b>Cottonseed cake—</b>								
Denmark.....	450,524	319,596	168,493	67,820	85.5	80.9	79.6	95.8
Germany.....	58,778	49,844	39,505	0	11.2	12.6	18.7	0
Other Europe.....	17,611	25,790	3,371	21	8.3	6.5	1.6	.1
Total Europe.....	526,913	395,230	211,364	67,841	100.0	100.0	99.9	95.9
Other countries.....	110	27	202	2,918	0	0	.1	4.1
Total.....	527,023	395,257	211,566	70,759	100.0	100.0	100.0	100.0
<b>Cottonseed meal—</b>								
United Kingdom.....	45,844	60,084	46,955	3,297	33.3	33.9	36.5	20.0
Germany.....	39,167	46,312	19,762	0	28.5	26.1	15.4	0
Norway.....	11,055	10,192	1,019	112	8.5	8.7	.8	.7
Other Europe.....	30,102	46,161	30,422	2,299	21.9	26.0	23.6	13.9
Total Europe.....	126,758	162,739	98,148	5,708	92.2	91.7	76.3	34.6
Canada.....	9,086	13,956	28,347	8,543	7.0	7.3	20.5	51.8
Other countries.....	1,054	1,720	4,112	2,247	.8	1.0	3.2	13.6
Total.....	137,498	177,415	128,607	16,498	100.0	100.0	100.0	100.0
<b>Linseed or flaxseed cake—</b>								
Netherlands.....	305,321	371,385	323,537	141,505	51.8	59.4	53.8	48.8
Belgium.....	235,883	204,205	164,988	59,849	40.0	32.7	30.7	31.0
United Kingdom.....	38,698	40,392	48,745	42,405	6.6	6.5	8.1	14.7
Other Europe.....	9,151	8,104	42,116	15,306	1.6	1.8	7.0	5.3
Total Europe.....	589,053	624,086	599,386	269,155	100.0	99.9	99.6	99.8
Other countries.....	121	827	2,433	591	0	.1	.4	.2
Total.....	589,174	624,913	601,819	269,746	100.0	100.0	100.0	100.0

<sup>1</sup>Excludes Bermuda.

TABLE 443.—*Destination of principal agricultural products exported from the United States, 1927-28 to 1930-31—Continued*

Article and country to which exported	Year beginning July							
	Quantity				Per cent of total			
	1927-28	1928-29	1929-30	1930-31	1927-28	1928-29	1929-30	1930-31
<b>VEGETABLE PRODUCTS—continued</b>								
<b>Oils, vegetable:</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
Cottonseed—								
Canada.....	49,407	20,550	24,666	9,152	80.4	60.6	77.1	34.7
Mexico.....	5,313	2,374	947	3,954	8.7	8.0	3.0	15.0
Cuba.....	2,033	1,836	2,448	9,855	3.3	6.2	7.7	37.4
Argentina.....	1,108	812	253	94	1.8	3.1	.8	.4
Japan.....	881	811	1,179	1,146	1.4	3.1	3.7	4.3
Panama.....	719	785	1,063	768	1.2	2.7	3.3	2.9
Other countries.....	2,084	2,160	1,442	1,384	3.2	7.3	4.4	5.3
<b>Total.....</b>	<b>61,470</b>	<b>29,531</b>	<b>31,968</b>	<b>26,353</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Sugar, refined:</b>	<i>1,000 short tons</i>	<i>1,000 short tons</i>	<i>1,000 short tons</i>	<i>1,000 short tons</i>				
United Kingdom.....	35	24	25	23	33.0	18.8	31.6	32.0
Norway.....	13	14	6	2	12.8	10.9	7.6	2.0
France.....	1	2	1	2	.9	1.6	1.3	2.0
Other Europe.....	12	6	8	7	11.3	4.6	10.1	9.0
<b>Total Europe.....</b>	<b>61</b>	<b>46</b>	<b>40</b>	<b>34</b>	<b>57.5</b>	<b>35.9</b>	<b>50.6</b>	<b>48.6</b>
Uruguay.....	13	26	6	7	12.3	20.3	7.6	10.0
West Indies and Bermudas.....	5	6	5	5	4.7	4.7	6.3	7.1
British Africa.....	5	12	6	5	4.7	9.4	7.6	7.1
Canada.....	4	7	3	2	3.8	5.5	3.8	2.9
Mexico.....	2	5	4	1	1.9	3.9	5.1	1.4
Panama.....	14	2	3	4	1.9	1.6	3.8	5.7
Other countries.....	14	24	12	12	13.2	18.7	15.2	17.2
<b>Total.....</b>	<b>106</b>	<b>128</b>	<b>79</b>	<b>70</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Tobacco, leaf.</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>				
Bright flue cured—								
United Kingdom.....	187,506	171,515	186,583	184,448	47.9	41.4	43.4	42.6
Germany.....	13,378	13,841	8,150	12,274	4.1	3.3	1.9	2.8
Other Europe.....	21,197	25,197	39,932	28,172	6.4	6.2	9.3	6.6
<b>Total Europe.....</b>	<b>192,081</b>	<b>210,553</b>	<b>234,665</b>	<b>224,894</b>	<b>58.4</b>	<b>50.9</b>	<b>54.6</b>	<b>52.0</b>
China.....	68,842	131,254	128,141	143,980	20.9	31.7	29.8	33.3
Australia.....	21,488	18,146	19,492	23,173	6.5	4.4	4.5	6.4
Canada.....	14,049	14,601	13,600	11,210	4.3	3.5	3.2	2.6
Japan.....	11,555	14,564	10,395	11,004	3.5	3.5	2.4	2.7
British India.....	5,031	5,884	3,874	1,162	1.5	1.4	.9	.3
Other countries.....	15,878	18,947	19,712	16,656	4.9	4.6	4.6	3.7
<b>Total.....</b>	<b>328,924</b>	<b>413,949</b>	<b>429,942</b>	<b>432,688</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Bureau of Agricultural Economics. Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1929-1931, and official records of the Bureau of Foreign and Domestic Commerce.

\*Includes Hong Kong and Kwantung.

TABLE 444.—Principal agricultural products imported into the United States, by countries, 1927-28 to 1930-31

Article and country from which imported	Year beginning July							
	Quantity				Per cent of total			
	1927-28	1928-29	1929-30	1930-31 <sup>1</sup>	1927-28	1928-29	1929-30	1930-31 <sup>1</sup>
	Thou- sands	Thou- sands	Thou- sands	Thou- sands	Per cent	Per cent	Per cent	Per cent
<b>ANIMALS AND ANIMAL PRODUCTS</b>								
Cattle:								
Canada.....	343	256	192	26	62.6	45.2	45.8	31.3
Mexico.....	201	300	226	56	37.2	54.6	53.0	67.5
Other countries.....	1	1	1	1	.2	.2	.3	1.2
Total.....	548	566	419	83	100.0	100.0	100.0	100.0
Butter:	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds				
United Kingdom.....	870	58	171	17	17.0	1.8	6.0	1.8
Denmark.....	761	902	1,109	172	15.4	27.3	38.9	12.9
Other Europe.....	463	279	38	26	9.1	8.5	1.3	2.0
Total Europe.....	2,094	1,239	1,318	215	42.1	37.6	46.2	16.2
New Zealand.....	2,396	1,674	1,141	877	48.4	50.7	40.0	66.0
Canada.....	275	237	142	162	5.5	7.2	5.0	12.2
Other countries.....	200	149	250	75	4.0	4.5	8.8	5.6
Total.....	4,965	3,299	2,851	1,329	100.0	100.0	100.0	100.0
Cheese:								
Italy.....	31,332	38,337	36,969	29,430	41.5	45.3	47.3	50.8
Switzerland.....	16,449	19,731	19,388	15,178	21.8	23.3	24.8	26.2
France.....	5,874	6,243	6,058	4,279	7.8	7.4	7.7	7.4
Netherlands.....	3,736	3,525	2,917	2,372	5.0	4.2	3.7	4.1
Other Europe.....	5,983	6,052	6,509	5,716	7.9	7.1	8.3	9.8
Total Europe.....	63,374	78,888	71,859	56,975	84.0	87.3	91.8	98.3
Canada.....	11,439	9,381	5,895	817	15.2	11.1	7.5	1.4
Other countries.....	611	1,337	606	180	.8	1.6	.7	.3
Total.....	75,424	84,606	78,261	57,972	100.0	100.0	100.0	100.0
Eggs, in the shell:	1,000 dozen	1,000 dozen	1,000 dozen	1,000 dozen				
Hong Kong.....	199	236	250	263	77.7	81.1	74.2	87.4
China.....	40	28	15	19	15.0	9.6	4.5	6.3
Canada.....	13	13	60	15	5.1	4.5	17.8	5.0
Other countries.....	4	14	12	4	1.6	4.8	3.5	1.3
Total.....	256	291	337	301	100.0	100.0	100.0	100.0
Eggs and egg yolks (dried, frozen, and preserved):	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds				
China.....	5,409	20,582	18,206	7,918	91.7	81.1	70.3	98.3
United Kingdom.....	248	3,285	4,498	70	4.2	13.4	10.6	.9
Other countries.....	214	593	253	62	4.1	2.5	1.1	.8
Total.....	5,901	24,460	22,957	8,050	100.0	100.0	100.0	100.0
Egg albumen:								
China.....	2,436	3,431	4,868	2,208	97.3	97.8	91.5	99.4
Other countries.....	78	77	450	13	2.7	2.2	8.5	.6
Total.....	2,514	3,508	5,318	2,221	100.0	100.0	100.0	100.0
Fibers, animal:								
Silk, raw, in skeins reeled from cocoon:								
Japan.....	64,673	63,415	61,243	67,309	85.4	82.1	78.8	82.3
China.....	9,816	12,326	12,717	10,432	13.0	16.0	16.4	12.8
Other countries.....	1,269	1,455	3,733	4,038	1.6	1.9	4.8	4.9
Total.....	75,758	77,196	77,693	81,779	100.0	100.0	100.0	100.0
Wool, unmanufactured								
Carpet wool:								
United Kingdom.....	32,123	33,861	23,326	14,085	22.3	20.6	16.5	13.6
France.....	5,414	4,470	4,260	1,814	3.7	2.7	3.0	1.8
China.....	55,998	53,549	30,931	33,053	38.5	32.5	26.2	32.5
British India.....	10,811	14,390	11,106	5,163	7.4	4.7	7.9	5.0
Argentina.....	8,921	19,820	21,405	25,567	6.1	12.0	17.3	24.8
Palestine and Syria.....	8,420	3,953	10,460	4,388	5.8	2.4	7.4	4.2
Other countries.....	24,409	34,640	30,623	18,641	16.2	21.1	21.7	18.1
Total.....	145,449	161,713	141,111	103,261	100.0	100.0	100.0	100.0

<sup>1</sup> Preliminary.

TABLE 444.—Principal agricultural products imported into the United States, by countries, 1927-28 to 1930-31—Continued

Article and country from which imported	Year beginning July							
	Quantity				Per cent of total			
	1927-28	1928-29	1929-30	1930-31	1927-28	1928-29	1929-30	1930-31
<b>ANIMALS AND ANIMAL PRODUCTS—continued</b>								
<b>Fibers, animal—Continued.</b>								
Wool, unmanufactured—Con.	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	Per cent	Per cent	Per cent	Per cent
Clothing wool—								
United Kingdom.....	4,169	2,499	1,807	1,800	21.5	13.6	9.6	27.4
Australia.....	5,515	5,936	5,690	2,871	28.5	32.2	30.2	43.8
Canada.....	2,838	1,601	1,129	312	11.6	8.7	6.0	4.8
Argentina.....	2,545	1,872	2,300	354	13.1	10.2	12.2	5.2
Chile.....	1,677	1,625	1,094	361	8.7	8.8	5.8	5.1
New Zealand.....	1,670	2,081	3,514	360	8.6	11.3	18.6	5.0
Uruguay.....	213	1,062	1,275	143	1.1	5.8	6.8	2.2
Other countries.....	747	1,732	2,017	351	3.9	9.4	10.8	5.1
Total.....	19,374	18,408	18,856	6,558	100.0	100.0	100.0	100.0
Combing wool—								
United Kingdom.....	17,344	12,319	8,794	2,933	21.6	14.8	15.0	7.0
Australia.....	21,992	17,906	14,911	22,018	27.4	21.4	25.5	50.1
Argentina.....	11,424	12,875	10,674	1,898	14.2	15.4	18.3	4.1
New Zealand.....	8,200	8,577	3,093	2,065	10.3	10.3	5.3	5.1
Uruguay.....	6,962	20,341	11,815	4,553	8.7	24.4	20.2	11.1
Other countries.....	14,300	11,400	9,197	5,261	17.8	13.7	15.7	13.1
Total.....	80,282	83,478	58,474	38,728	100.0	100.0	100.0	100.0
Hair of the Angora goat (mohair), alpaca, etc.—								
United Kingdom.....	541	394	391	350	18.7	8.9	19.2	35.0
Turkey (Europe and Asia).....	983	2,034	553	9	34.0	40.9	27.2	0.0
British South Africa.....	660	884	370	407	22.8	20.4	18.2	40.0
Peru.....	425	716	622	149	14.7	16.5	30.6	14.0
China.....	184	145	48	26	6.4	3.3	2.4	2.0
Other countries.....	97	175	52	58	3.4	4.0	2.4	5.1
Total.....	2,890	4,338	2,036	999	100.0	100.0	100.0	100.0
<b>Sausage casings:</b>								
Germany.....	1,353	2,599	1,818	763	6.9	11.8	8.4	5.1
Argentina.....	4,075	5,719	5,459	3,897	25.5	26.0	25.3	29.2
Canada.....	3,928	2,959	2,218	1,808	20.1	13.6	10.3	13.1
Australia.....	2,213	2,597	3,024	1,638	11.3	11.8	14.0	12.1
China.....	1,640	1,445	1,256	918	8.4	6.6	5.8	6.1
New Zealand.....	1,223	1,086	1,470	798	6.3	4.9	6.8	6.0
Uruguay.....	917	1,317	1,527	736	4.7	6.0	7.1	5.1
Other countries.....	3,296	4,288	4,789	2,797	16.8	19.3	22.3	20.1
Total.....	19,545	22,040	21,556	13,355	100.0	100.0	100.0	100.0
<b>VEGETABLE PRODUCTS</b>								
<b>Cocoa or cacao beans:</b>								
Germany.....	29,074	17,424	8,565	11,506	7.1	4.2	2.0	2.1
British West Africa.....	133,963	146,730	145,400	151,524	32.6	35.0	34.6	36.1
Brazil.....	100,262	87,338	95,516	75,726	24.4	20.8	22.6	18.1
Dominican Republic.....	39,591	50,353	41,120	37,898	9.6	12.0	9.7	9.1
British West Indies and Bermudas.....	38,217	41,933	39,276	41,805	9.3	10.0	9.3	10.1
Ecuador.....	19,210	16,939	14,754	13,170	4.7	4.0	3.5	3.1
Venezuela.....	14,482	18,008	19,302	17,338	3.5	4.3	4.6	4.1
Other countries.....	36,744	40,509	58,005	66,475	8.8	9.7	13.8	15.1
Total.....	411,543	410,243	421,938	415,442	100.0	100.0	100.0	100.0
<b>Coffee:</b>								
Brazil.....	1,059,742	933,056	1,011,430	1,196,881	60.0	65.0	64.7	69.1
Colombia.....	261,678	263,236	351,333	330,379	17.0	18.3	22.5	19.1
Central America.....	64,443	54,774	56,763	53,276	4.2	3.8	3.6	3.1
Other countries.....	140,529	184,004	142,532	148,033	9.8	12.9	9.2	8.1
Total.....	1,535,392	1,435,070	1,562,058	1,728,569	100.0	100.0	100.0	100.0

TABLE 444.—Principal agricultural products imported into the United States, by countries, 1927-28 to 1930-31—Continued

Article and country from which imported	Year beginning July							
	Quantity				Per cent of total			
	1927-28	1928-29	1929-30	1930-31	1927-28	1928-29	1929-30	1930-31
<b>VEGETABLE PRODUCTS—contd.</b>								
<b>Fibers, vegetable:</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
Cotton, raw—								
Egypt—	91,581	135,007	86,872	10,183	53.9	59.4	41.0	10.9
China—	32,123	18,554	22,046	14,883	18.3	8.2	11.2	29.1
British India—	12,467	25,736	28,207	16,628	7.1	11.3	14.3	32.3
Mexico—	11,508	26,004	19,456	6,506	6.6	11.4	9.9	13.3
Peru—	9,140	8,036	9,151	959	5.2	3.8	4.6	1.9
Other countries—	15,025	13,517	31,706	1,833	8.9	5.9	16.0	3.5
Total—	175,450	227,454	197,657	51,192	100.0	100.0	100.0	100.0
<b>Flax, unmanufactured</b>	<i>Long tons</i>	<i>Long tons</i>	<i>Long tons</i>	<i>Long tons</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
United Kingdom—	1,800	1,768	1,768	383	33.1	31.1	25.2	10.6
Latvia—	1,520	2,176	2,231	1,026	29.0	38.5	31.8	53.5
Belgium—	739	767	810	536	13.6	13.4	11.5	14.9
Netherlands—	253	208	231	154	4.7	3.7	3.3	4.3
Russia in Europe—	119	201	1,127	155	2.7	5.2	10.1	4.3
Estonia—	113	0	31	0	2.1	0	.4	0
Other Europe—	613	283	664	275	11.2	5.0	9.5	7.7
Total Europe—	5,187	5,470	6,862	3,429	95.4	98.9	97.8	95.3
Canada—	126	72	97	137	2.3	1.3	1.4	3.8
Other countries—	121	102	54	32	2.3	1.8	.8	.9
Total—	5,437	5,650	7,013	3,598	100.0	100.0	100.0	100.0
<b>Manila fiber—</b>	<i>1,000 long tons</i>	<i>1,000 long tons</i>	<i>1,000 long tons</i>	<i>1,000 long tons</i>				
Philippine Islands—	47	60	71	42	97.9	100.0	97.3	97.7
Other countries—	1	0	2	1	2.1	0	2.7	2.3
Total—	48	60	73	43	100.0	100.0	100.0	100.0
<b>Sisal and henequen—</b>								
Mexico—	93	95	57	38	75.0	70.4	50.9	45.2
Dutch East Indies—	16	20	30	25	12.9	14.8	26.8	29.5
United Kingdom—	0	2	2	7	0	1.5	1.8	8.3
Cuba—	2	2	3	4	1.6	1.5	2.7	4.8
Other countries—	13	16	20	10	10.5	11.8	17.8	11.9
Total—	124	135	113	84	100.0	100.0	100.0	100.0
<b>Fruits—</b>								
Dried—	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>				
Currants—								
Greece—	10,800	9,178	9,950	8,591	97.9	97.8	99.0	99.8
Other Europe—	56	108	13	0	.5	1.2	.1	0
Total Europe—	10,856	9,286	9,963	8,591	98.4	99.0	99.1	99.8
Other countries—	178	96	92	16	1.6	1.0	.9	.2
Total—	11,034	9,382	10,055	8,610	100.0	100.0	100.0	100.0
Dates—								
United Kingdom—	6,987	3,045	1,350	5,544	15.8	5.7	2.5	13.1
Iraq—	34,700	45,373	48,804	34,418	78.6	83.9	91.7	81.1
Hajaz, Arabia, etc.—	694	476	703	990	1.6	.9	1.3	2.3
Other countries—	1,747	5,153	2,302	1,476	4.0	9.5	4.5	3.5
Total—	44,128	54,087	53,250	42,428	100.0	100.0	100.0	100.0
Figs—								
Turkey (Europe and Asia)—	16,566	22,418	12,784	9,998	52.7	63.0	58.3	67.4
Portugal—	5,933	4,401	934	843	18.9	12.4	4.3	5.7
Greece—	2,465	4,910	6,084	2,933	7.8	13.8	27.8	19.8
Italy—	1,943	1,358	641	1,018	6.2	3.8	2.9	6.9
Other countries—	4,552	2,473	1,474	33	14.4	7.0	6.7	.2
Total—	31,459	35,563	21,917	14,825	100.0	100.0	100.0	100.0

TABLE 444.—Principal agricultural products imported into the United States, by countries, 1927-28 to 1930-31—Continued

Article and country from which imported	Year beginning July							
	Quantity				Per cent of total			
	1927-28	1928-29	1929-30	1930-31	1927-28	1928-29	1929-30	1930-31
<b>VEGETABLE PRODUCTS—contd.</b>								
<b>Fruits—Continued.</b>								
<b>Fresh—</b>								
Bananas—	1,000 bunches	1,000 bunches	1,000 bunches	1,000 bunches	Per cent	Per cent	Per cent	Per cent
Central America.....	39,676	42,386	42,784	36,818	62.0	66.7	61.9	63.7
Jamaica.....	13,398	11,722	11,613	11,010	20.9	14.4	17.5	19.0
Cuba.....	2,730	3,467	4,149	3,562	4.3	5.5	6.3	6.2
Colombia.....	1,695	1,439	1,171	900	2.6	2.3	1.8	1.6
Other countries.....	6,530	4,516	6,312	5,512	10.2	7.1	9.5	9.5
Total.....	64,029	63,530	65,909	57,841	100.0	100.0	100.0	100.0
Lemons—	1,000 boxes <sup>2</sup>	1,000 boxes <sup>2</sup>	1,000 boxes <sup>2</sup>	1,000 boxes <sup>2</sup>	Per cent	Per cent	Per cent	Per cent
Italy.....	1,300	282	1,217	342	99.4	97.7	99.0	97.7
Other Europe.....	4	8	10	8	.3	2.0	.9	2.3
Total Europe.....	1,304	290	1,227	350	99.7	99.7	99.9	100.0
Other countries.....	4	1	2	0	.3	.3	.1	0
Total.....	1,308	291	1,229	350	100.0	100.0	100.0	100.0
Olives—	1,000 gallons	1,000 gallons	1,000 gallons	1,000 gallons				
Spain.....	5,739	6,209	7,746	6,049	88.9	89.3	91.6	89.5
Greece.....	144	204	308	625	2.2	2.9	3.6	8.4
Other Europe.....	532	496	357	144	8.2	7.1	4.3	2.0
Total Europe.....	6,415	6,909	8,411	7,418	99.3	99.3	99.5	99.9
Other countries.....	43	46	41	11	.7	.7	.5	.1
Total.....	6,458	6,955	8,452	7,429	100.0	100.0	100.0	100.0
Grains, flours, etc.:—	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds				
Rice, cleaned (except patna)—								
Italy.....	3,971	1,032	1,310	1,391	11.8	4.1	6.3	5.2
Netherlands.....	2,139	271	1,622	2,419	6.4	1.1	7.7	9.1
Germany.....	1,077	396	480	2,367	3.2	1.6	2.3	8.9
Hong Kong.....	20,736	17,934	15,094	15,878	61.7	71.3	72.1	59.6
Mexico.....	1,264	1,022	1,259	2,700	3.8	4.1	6.0	10.1
British India.....	1,061	2,380	213	1,050	3.2	9.5	1.2	4.0
Other countries.....	3,376	2,131	929	812	9.9	8.3	4.4	3.1
Total.....	33,674	25,166	20,946	26,626	100.0	100.0	100.0	100.0
Rice, patna—								
Netherlands.....	1,826	2,320	2,010	2,051	100.0	100.0	92.4	96.9
Other countries.....	0	0	166	65	0	0	7.6	3.1
Total.....	1,826	2,320	2,176	2,116	100.0	100.0	100.0	100.0
Rice, uncleaned—								
Mexico.....	3,036	5,904	4,181	0	59.6	73.3	59.7	0
Japan.....	2,316	1,441	1,492	5,011	38.6	17.9	21.3	81.2
British India.....	428	325	694	419	7.1	4.0	9.9	6.8
Other countries.....	210	390	638	732	3.7	4.8	9.1	11.9
Total.....	5,990	8,060	7,005	6,162	100.0	100.0	100.0	100.0
Rice, flour, and meal—								
Netherlands.....	21	0	100	0	.8	0	9.2	0
Mexico.....	1,981	508	340	0	76.0	41.0	31.3	0
Japan.....	442	504	472	426	17.0	40.7	43.5	70.6
China.....	38	68	51	24	1.5	5.5	4.7	4.0
Other countries.....	124	159	122	153	4.7	12.8	11.3	25.4
Total.....	2,606	1,229	1,085	603	100.0	100.0	100.0	100.0
Wheat—	1,000 bushels	1,000 bushels	1,000 bushels	1,000 bushels				
Canada.....	15,700	21,429	12,948	19,063	100.0	100.0	100.0	100.0
Other countries.....	0	1	0	1	0	0	0	0
Total.....	15,700	21,430	12,948	19,064	100.0	100.0	100.0	100.0

<sup>2</sup> Boxes of 74 pounds net.

# FOREIGN TRADE IN AGRICULTURAL PRODUCTS 877

**TABLE 444.—Principal agricultural products imported into the United States, by countries, 1927-28 to 1930-31—Continued**

Article and country from which imported	Year beginning July							
	Quantity				Per cent of total			
	1927-28	1928-29	1929-30	1930-31	1927-28	1928-29	1929-30	1930-31
<b>VEGETABLE PRODUCTS contd.</b>								
<b>Grains, flours, etc. Continued.</b>								
Wheat flour—	1,000 barrels	1,000 barrels	1,000 barrels	1,000 barrels	Per cent	Per cent	Per cent	Per cent
Canada .....	3	2	1	1	50.0	66.7	50.0	100.0
Ecuador .....	2	0	0	0	33.3	0	0	0
United Kingdom .....	0	0	1	0	0	0	50.0	0
Other countries .....	1	1	0	0	16.7	33.3	0	0
<b>Total .....</b>	<b>6</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Nuts:</b>	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	Per cent	Per cent	Per cent	Per cent
Almonds, shelled—								
Spain .....	8,637	10,399	8,902	6,432	52.8	57.4	48.6	48.6
Italy .....	7,703	6,578	8,912	6,948	42.2	36.3	48.7	47.9
France .....	306	286	136	223	1.7	1.6	.7	1.7
Other Europe .....	197	273	118	61	1.0	1.6	.7	.5
<b>Total Europe .....</b>	<b>17,813</b>	<b>17,536</b>	<b>18,068</b>	<b>13,664</b>	<b>97.7</b>	<b>96.9</b>	<b>98.7</b>	<b>95.7</b>
Other countries .....	414	570	236	177	2.3	3.1	1.3	1.3
<b>Total .....</b>	<b>18,227</b>	<b>18,106</b>	<b>18,304</b>	<b>13,841</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
Almonds, not shelled—								
Spain .....	220	1,068	4,530	3	49.4	50.5	82.3	3.9
France .....	131	474	518	54	28.2	25.1	9.4	60.2
Italy .....	98	73	375	18	21.1	3.9	6.8	23.1
Other Europe .....	5	207	61	0	1.1	14.0	1.2	0
<b>Total Europe .....</b>	<b>463</b>	<b>1,882</b>	<b>5,484</b>	<b>75</b>	<b>99.8</b>	<b>90.5</b>	<b>99.7</b>	<b>90.2</b>
Other countries .....	1	9	19	3	.2	.5	.3	3.6
<b>Total .....</b>	<b>464</b>	<b>1,891</b>	<b>5,503</b>	<b>78</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Filberts, shelled—</b>								
Turkey in Europe .....	2,559	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	38.8	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )
France .....	1,206	1,027	178	334	18.3	18.3	4.0	7.3
Spain .....	329	1,764	2,888	37	5.0	31.6	64.1	.8
Other Europe .....	447	984	826	797	6.7	17.5	18.3	17.3
<b>Total Europe .....</b>	<b>4,541</b>	<b>3,775</b>	<b>3,892</b>	<b>1,165</b>	<b>68.5</b>	<b>67.3</b>	<b>86.4</b>	<b>25.4</b>
Turkey in Asia .....	2,069	1,800	4,009	3,417	31.2	32.1	13.5	74.3
Other countries .....	0	31	2	0	0	0	.1	.3
<b>Total .....</b>	<b>6,610</b>	<b>5,606</b>	<b>4,903</b>	<b>4,582</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Filberts, not shelled—</b>								
Italy .....	6,667	11,053	4,548	3,987	59.5	91.1	79.2	70.5
Spain .....	1,956	818	974	423	17.2	6.7	16.6	7.5
Turkey in Europe .....	1,211	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	10.8	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )
Other Europe .....	1,260	213	254	229	11.2	2.0	4.2	4.0
<b>Total Europe .....</b>	<b>11,103</b>	<b>12,114</b>	<b>5,756</b>	<b>4,639</b>	<b>98.7</b>	<b>99.8</b>	<b>100.0</b>	<b>82.0</b>
Turkey in Asia .....	51	420	40	420	.5	4.2	4.0	11.6
Other countries .....	87	0	0	200	.5	0	0	3.5
<b>Total .....</b>	<b>11,241</b>	<b>12,134</b>	<b>5,756</b>	<b>5,659</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Peanuts, shelled—</b>								
China .....	49,986	23,957	7,140	4,950	91.2	90.2	89.2	91.9
Other countries .....	4,798	2,619	861	441	8.8	9.8	10.8	8.1
<b>Total .....</b>	<b>54,784</b>	<b>26,576</b>	<b>8,001</b>	<b>5,391</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
<b>Peanuts, not shelled—</b>								
China .....	12,339	4,650	2,445	3,483	91.4	82.0	75.0	65.0
Japan, incl. Chosen .....	509	300	212	343	3.8	6.3	6.5	6.4
Philippine Islands .....	0	0	351	1,075	0	0	10.8	20.1
Other countries .....	650	669	253	457	4.8	11.7	7.7	8.5
<b>Total .....</b>	<b>13,498</b>	<b>5,619</b>	<b>3,261</b>	<b>5,338</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

<sup>1</sup> Included with "Turkey in Asia."

<sup>4</sup> Includes "Turkey in Europe."

TABLE 444.—Principal agricultural products imported into the United States, by countries, 1927-28 to 1930-31—Continued

Article and country from which imported	Year beginning July							
	Quantity				Per cent of total			
	1927-28	1928-29	1929-30	1930-31	1927-28	1928-29	1929-30	1930-31
<b>VEGETABLE PRODUCTS—contd.</b>								
<b>Nuts—Continued.</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
Walnuts, shelled—								
France.....	12,551	9,308	11,357	4,679	78.4	61.8	65.7	28.7
Other Europe.....	989	2,033	722	2,090	6.1	11.4	4.2	12.8
Total Europe.....	13,540	11,341	12,079	6,769	84.5	63.2	69.9	41.5
China.....	1,952	5,053	4,364	8,216	12.2	28.1	25.3	50.2
Other countries.....	523	1,563	835	1,341	3.3	8.7	4.8	8.2
Total.....	16,015	17,956	17,278	16,326	100.0	100.0	100.0	100.0
Walnuts, not shelled—								
Italy.....	4,553	4,501	4,620	2,356	44.2	28.9	65.8	66.3
France.....	2,244	2,720	831	477	21.8	17.5	11.8	13.4
Other Europe.....	144	3,336	117	99	1.3	21.4	1.7	2.8
Total Europe.....	6,946	10,557	5,568	2,932	67.3	67.8	79.3	82.5
China.....	2,531	4,575	1,419	504	21.5	29.4	20.2	14.2
Other countries.....	837	449	37	116	8.2	2.8	.5	3.3
Total.....	10,314	15,581	7,024	3,552	100.0	100.0	100.0	100.0
<b>Oils, vegetable:</b>								
Coconut oil, product of Philippine Islands.....	273,309	377,288	370,600	315,942	100.0	100.0	100.0	100.0
<b>Olive oil, edible—</b>								
Italy.....	45,145	62,202	71,265	45,681	64.4	70.6	72.4	61.9
Spain.....	17,797	16,910	20,909	23,675	25.4	19.2	21.2	32.1
France.....	5,835	6,182	2,959	2,385	7.6	7.0	3.0	3.2
Other Europe.....	934	1,527	710	542	1.3	1.7	.8	.7
Total Europe.....	69,231	86,821	95,843	72,213	98.7	98.5	97.4	97.9
Other countries.....	899	1,297	2,603	1,581	1.3	1.5	2.6	2.1
Total.....	70,130	88,118	98,446	73,794	100.0	100.0	100.0	100.0
<b>Soybean oil—</b>								
Kwantung.....	13,546	11,089	12,867	5,769	93.0	61.6	96.5	97.5
China.....	891	1,520	0	0	6.1	8.9	0	0
Japan.....	41	1,729	121	1	.3	10.1	.9	0
Other countries.....	84	2,834	345	145	.6	16.4	2.6	2.5
Total.....	14,562	17,172	13,332	5,915	100.0	100.0	100.0	100.0
<b>Oilseeds:</b>								
Copra, not prepared—								
Philippine Islands.....	336,920	386,567	299,193	311,781	73.9	61.4	60.6	55.1
British Malaya.....	40,381	84,700	42,114	57,619	8.9	13.4	8.5	10.2
French Oceania.....	25,273	21,306	22,662	21,482	5.5	3.4	4.6	3.8
British Oceania.....	19,941	37,685	43,778	48,774	4.4	6.0	8.9	8.6
Australia.....	17,445	55,908	35,455	30,077	3.8	8.9	7.2	5.3
Other countries.....	16,198	43,691	50,254	95,064	3.5	6.9	10.2	17.0
Total.....	456,168	629,937	493,456	555,397	100.0	100.0	100.0	100.0
<b>Flaxseed—</b>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>				
Argentina.....	16,037	20,927	19,236	6,102	88.7	89.1	97.9	78.1
Canada.....	1,933	2,528	355	1,490	10.7	10.8	1.8	19.1
Other countries.....	122	89	61	221	.6	.1	.3	2.8
Total.....	18,112	23,494	19,652	7,813	100.0	100.0	100.0	100.0
<b>Seeds, except oilseeds:</b>								
Clover seed—	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>				
Clover, red—								
Poland and Danzig.....	2,015	1,278	1,141	0	37.1	16.9	48.4	0
Russia in Europe.....	1,328	202	88	0	24.4	2.7	3.7	0
Germany.....	697	679	283	0	12.8	9.0	12.0	0
France.....	493	3,664	845	2,249	9.1	48.5	35.9	100.0
Other Europe.....	855	1,578	0	0	15.8	20.9	0	0
Total Europe.....	5,388	7,401	2,357	2,249	99.2	98.0	100.0	100.0
Other countries.....	46	151	0	0	.8	2.0	0	0
Total.....	5,434	7,552	2,357	2,249	100.0	100.0	100.0	100.0

TABLE 444.—Principal agricultural products imported into the United States, by countries, 1927-28 to 1930-31—Continued

Article and country from which imported	Year beginning July							
	Quantity				Per cent of total			
	1927-28	1928-29	1929-30	1930-31	1927-28	1928-29	1929-30	1930-31
<b>VEGETABLE PRODUCTS—cont'd.</b>								
Seeds, except oilseeds—Cont'd.								
Clover seed—Continued.								
All other, including alsike, crimson, and all other clover—	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	Per cent	Per cent	Per cent	Per cent
Poland and Danzig.....	964	957	963	330	5.9	6.4	7.4	7.8
Germany.....	799	1,651	2,149	686	4.9	11.0	16.5	16.3
France.....	791	2,750	589	1,450	4.8	18.4	4.5	34.5
Hungary.....	485	372	1,546	1,510	3.0	2.5	11.8	35.9
Other Europe.....	221	303	280	129	1.3	2.1	2.2	3.1
Total Europe.....	3,260	6,033	5,533	4,105	10.9	40.4	42.4	97.6
Canada.....	13,121	8,809	7,515	93	50.0	59.5	57.6	2.3
Other countries.....	16	12	0	8	.1	.1	0	.1
Total.....	16,397	14,844	13,048	4,203	100.0	100.0	100.0	100.0
Spices:								
Pepper, unground—								
United Kingdom.....	5,202	3,435	3,238	1,499	22.1	13.4	10.4	4.8
British India.....	7,907	6,218	7,505	6,995	32.9	24.2	24.2	22.3
Dutch East Indies.....	6,446	9,205	17,250	19,351	26.9	35.9	55.7	61.8
British Malaya.....	2,831	1,469	870	1,409	11.8	5.7	2.8	4.5
Other countries.....	1,502	5,336	2,125	2,045	6.3	20.8	6.9	6.6
Total.....	23,078	25,663	30,988	31,299	100.0	100.0	100.0	100.0
Sugar, raw, cane:	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons				
Cuba.....	3,399	4,109	2,769	3,010	84.0	86.5	76.1	91.5
Philippine Islands.....	613	605	800	254	15.2	12.7	22.2	7.7
Other countries.....	33	38	63	24	.8	.5	1.7	.8
Total.....	4,045	4,752	3,641	3,288	100.0	100.0	100.0	100.0
Tea:	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 lbs.				
United Kingdom.....	20,380	23,608	21,578	23,310	22.6	25.5	25.0	28.7
Japan.....	26,399	27,329	22,048	21,410	28.2	29.5	25.5	24.6
Ceylon.....	16,326	16,893	19,047	16,895	18.1	18.2	22.1	19.4
China.....	10,131	8,878	7,405	6,704	11.1	9.6	8.6	7.7
British India.....	9,198	7,688	9,217	10,612	10.2	8.3	10.7	12.2
Dutch East Indies.....	5,368	5,358	4,891	5,184	6.0	5.8	5.7	5.9
Other countries.....	3,267	2,881	2,152	3,027	3.8	3.1	2.4	3.5
Total.....	90,099	92,635	86,363	87,148	100.0	100.0	100.0	100.0
Tobacco, leaf, unmanufactured:								
Leaf, product of Philippine Islands.....	2,541	4,678	4,007	4,278	100.0	100.0	100.0	100.0
Leaf, for cigar wrappers—								
Netherlands.....	6,218	6,095	8,415	2,988	98.0	98.1	98.5	98.3
Other countries.....	126	117	126	51	2.0	1.9	1.5	1.7
Total.....	6,344	6,212	8,541	3,039	100.0	100.0	100.0	100.0
All other leaf—								
Greece.....	15,694	16,741	13,400	15,913	22.3	25.4	27.7	30.2
Italy.....	13,743	11,286	6,563	12,121	19.6	17.1	13.6	19.3
Germany.....	1,242	305	301	71	1.8	.5	.8	.1
Cuba.....	21,530	22,116	21,773	18,299	30.7	33.5	45.0	29.2
Turkey (Europe and Asia).....	17,289	14,269	6,162	12,974	24.6	21.6	12.7	20.7
Other countries.....	729	1,284	87	284	1.0	1.9	.2	.5
Total.....	70,227	66,001	48,376	62,665	100.0	100.0	100.0	100.0
India rubber, crude:								
United Kingdom.....	110,575	50,938	7,249	27,970	11.9	4.2	.6	2.7
British Malaya.....	521,534	811,543	785,594	738,419	56.7	66.2	69.3	71.1
Dutch East Indies.....	170,161	215,863	195,297	164,690	18.4	17.6	17.2	16.0
Ceylon.....	73,542	112,257	118,425	86,985	7.9	9.1	10.4	8.4
Other countries.....	46,923	86,028	27,841	19,134	5.1	2.9	2.5	1.8
Total.....	926,040	1,226,929	1,137,406	1,032,196	100.0	100.0	100.0	100.0

Bureau of Agricultural Economics. Compiled from Monthly Summary of Foreign Commerce of the United States, June issues, 1929-1931, and official records of the Bureau of Foreign and Domestic Commerce.

TABLE 445.—*Vegetable oils: Exports from the United States, 1909-10 to 1930-31*

Year beginning July—	Corn	Cotton-seed	Linseed	Cocoa butter or but-terine	Coconut	Peanut	Soybean
	1,000 pounds	1,000 pounds	1,000 gallons	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
1909-10.....	11,299	223,965	228				
1910-11.....	25,371	225,521	175				
1911-12.....	23,866	399,471	247				
1912-13.....	19,839	315,233	1,734				
1913-14.....	18,262	192,963	239				
1914-15.....	17,790	318,367	1,212				
1915-16.....	8,968	266,512	714				
1916-17.....	8,780	158,912	1,202				
1917-18.....	1,831	100,780	1,188				
1918-19.....	1,095	178,709	1,096				
1919-20.....	12,453	159,400	1,136	11,043	141,058	4,922	67,782
1920-21.....	6,919	283,268	561	3,171	6,639	1,595	5,118
1921-22.....	5,280	91,615	368	1,858	10,185	1,802	537
1922-23.....	5,224	64,292	414	957	12,993	188	2,495
1923-24.....	4,196	39,418	330	888	19,423	108	2,892
1924-25.....	3,586	53,261	320	1,577	17,890	( <sup>1</sup> )	579
1925-26.....	2,927	59,015	311	1,766	15,444	( <sup>1</sup> )	623
1926-27.....	405	57,680	365	290	19,826	( <sup>1</sup> )	3,104
1927-28.....	329	61,470	266	1,897	22,358	( <sup>1</sup> )	7,514
1928-29.....	323	29,531	269	1,010	24,556	( <sup>1</sup> )	8,241
1929-30.....	363	31,998	284	347	30,225	( <sup>1</sup> )	5,609
1930-31 <sup>2</sup> .....	915	26,353	173	463	10,963	( <sup>1</sup> )	4,410

Bureau of Agricultural Economics. Compiled from Foreign Commerce and Navigation of the United States, 1910-1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1931.

<sup>1</sup> Included with "Other vegetable oils and fats."

<sup>2</sup> Preliminary.

TABLE 446.—*Vegetable oils: Imports into the United States, 1909-10 to 1930-31*

Year beginning July—	Cas-tor <sup>1</sup>	Chi-nese nut	Cocoa butter or but-terine	Coco-nut	Cot-ton-seed <sup>1</sup>	Lin-seed	Olive	Palm	Palm kernel	Pea-nut	Rapo-seed	Soy-bean
	1,000 gals.	1,000 gals.	1,000 lbs.	1,000 lbs.	1,000 lbs.	1,000 gals.	1,000 gals.	1,000 lbs.	1,000 lbs.	1,000 gals.	1,000 gals.	1,000 lbs.
1909-10.....	7 <sup>2</sup>	5,760	3,370	48,346	( <sup>3</sup> )	( <sup>4</sup> )	4,545	92,772	( <sup>5</sup> )	( <sup>6</sup> )	<sup>7</sup> 1,083	( <sup>8</sup> )
1910-11.....	7 <sup>2</sup>	7,042	4,279	51,118	( <sup>3</sup> )	( <sup>4</sup> )	4,984	57,100	( <sup>5</sup> )	( <sup>6</sup> )	<sup>7</sup> 1,363	( <sup>8</sup> )
1911-12.....	6	4,768	6,075	46,371	1,513	737	5,473	47,159	25,398	896	1,183	28,021
1912-13.....	5	5,997	3,603	50,504	3,384	174	5,840	50,229	23,669	1,106	1,550	12,340
1913-14.....	189	4,932	2,839	74,386	17,293	162	6,981	58,040	34,328	1,337	1,464	10,360
1914-15.....	63	4,940	150	63,135	15,162	535	7,364	31,486	4,906	853	1,409	19,207
1915-16.....	233	4,968	400	66,008	17,181	50	8,100	40,497	6,781	1,475	2,561	98,120
1916-17.....	324	6,864	106	79,223	13,703	111	8,184	36,074	1,857	3,026	1,085	162,600
1917-18.....	1,175	4,816	( <sup>9</sup> )	259,195	14,291	51	2,652	27,405	19	8,289	3,056	330,525
1918-19.....	472	6,217	3,444	728	20,410	990	4,308	19,281	1,045	11,393	2,091	230,505
1919-20.....	271	10,614	42,271	540	24,165	4,550	7,029	50,165	54	22,064	1,230	195,774
1920-21.....	99	4,440	915	173,659	1,315	1,997	4,705	31,076	2,769	2,422	1,172	49,331
1921-22.....	46	7,410	7,123	230,236	( <sup>9</sup> )	22,494	11,112	39,159	-----	384	1,352	8,263
1922-23.....	185	11,919	3,010	212,573	45	7,668	15,685	118,816	-----	1,007	1,770	38,035
1923-24.....	36	10,786	1,169	181,230	( <sup>9</sup> )	2,379	15,121	86,784	1,126	2,008	2,068	17,631
1924-25.....	41	12,626	733	250,121	0	3,145	15,743	114,387	37,864	468	1,959	20,434
1925-26.....	66	11,315	14,200	878	283	2,231	18,368	152,254	85,074	450	2,088	17,401
1926-27.....	22	13,657	25,626	776	6,396	177	17,964	110,184	14,760	1,061	2,731	28,553
1927-28.....	125	11,150	18,273	309	1	46	15,746	183,977	50,021	648	2,604	14,502
1928-29.....	17	15,365	17,377	288	( <sup>9</sup> )	890	19,706	228,230	80,614	454	2,543	17,172
1929-30.....	16	17,459	270	370,600	2	722	21,149	237,860	41,880	202	2,152	13,333
1930-31 <sup>7</sup> .....	17	13,254	15	315,492	1	34	16,827	313,940	17,196	2,622	1,980	6,915

Bureau of Agricultural Economics. Compiled from Foreign Commerce and Navigation of the United States 1910-1918; Monthly Summary of Foreign Commerce of the United States, June issues, 1919-1931.

<sup>1</sup> Imports for consumption. (See introduction to Agricultural Statistics.)

<sup>2</sup> Includes peanut oil.

<sup>3</sup> Included in all other fixed or expressed.

<sup>4</sup> Included in Chinese nut oil.

<sup>5</sup> Includes hempseed.

<sup>6</sup> Less than 500 pounds.

<sup>7</sup> Preliminary.

TABLE 447.—Oil cake and oil-cake meal: International trade, average 1925-1929, annual 1928-1930

Country	Calendar year							
	Average 1925-1929		1928		1929		1930 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
<b>PRINCIPAL EXPORTING COUNTRIES</b>								
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
United States.....	1,394,589	196,588	1,186,934	250,786	1,278,525	334,172	511,392	134,148
Russia.....	672,830	0	322,756	0	651,038	0	614,127	0
British India.....	584,664	246	609,241	320	705,990	229	530,085	177
Egypt.....	356,706	3	347,802	0	391,062	0	503,541	0
France.....	338,094	75,294	438,107	75,411	360,341	102,373	553,794	90,974
China.....	270,571	0	287,111	0	291,910	0	300,908	0
Italy.....	242,957	003	324,048	230	303,662	436	134,412	3,665
Rumania.....	<sup>2</sup> 143,450	<sup>3</sup> 9						
Argentina.....	139,227	0	144,049	0	140,339	0	144,238	0
Dutch East Indies.....	135,473	0	171,581	0	182,958	0	<sup>3</sup> 135,700	0
Peru.....	70,465	0	79,042	0	66,540	0	78,715	0
Brazil.....	54,650	0	44,407	0	58,633	0	57,887	0
Canada.....	45,404	15,863	44,419	13,930	51,032	21,931	35,907	16,559
Bulgaria.....	37,520	10	46,972	0	55,701	30	77,675	0
Spain.....	28,199	3,764	13,898	5,116	10,853	7,545	5,135	12,572
British Malaya.....	14,302	11,530	18,079	16,770	17,183	16,858	12,811	11,933
Chile.....	7,725	1	3,780	0	5,640	0		
Australia.....	6,921	2,404	5,711	0,261	10,210	938	7,567	1,068
Latvia.....	4,355	0	2,489	0	3,058	0	11,665	0
Total.....	4,546,162	306,303	4,180,426	367,824	4,590,708	464,512	3,714,459	271,096
<b>PRINCIPAL IMPORTING COUNTRIES</b>								
Denmark.....	20,788	1,558,619	30,050	1,432,965	31,326	1,612,452	1,464,319	
Germany.....	768,849	1,064,314	972,716	1,205,083	620,202	1,163,837	594,523	980,524
United Kingdom.....	167,379	1,001,906	208,134	809,899	100,247	993,657	134,227	992,080
Netherlands.....	120,322	680,253	120,920	669,165	133,907	535,947	141,231	487,119
Japan.....	43,218	346,965	58,424	353,768	78,254	310,707	23,276	321,335
Belgium.....	83,183	324,674	95,929	334,711	99,879	337,025	81,111	391,617
Sweden.....	12,655	305,454	9,416	311,856	18,261	290,655	28,194	307,963
Finland.....	0	183,687	0	227,675	0	163,685	0	155,983
Irish Free State.....	0	111,617	0	103,412	0	108,652	0	110,229
Czechoslovakia.....	54,113	76,079	46,185	106,306	59,654	97,314	97,404	99,771
Switzerland.....	13,977	75,127	17,734	75,052	12,844	69,505	10,937	57,948
Norway.....	994	63,263	1	63,481	4,730	33,812		49,553
Poland.....	28,546	56,356	27,397	84,824	35,885	69,690	33,685	43,529
Ceylon.....	23,261	42,090	32,680	42,636	37,344	40,195	31,234	33,307
Austria.....	1,411	31,822	899	45,513	1,628	41,111	1,002	38,518
Hungary.....	16,310	16,411	12,043	29,301	24,675	27,115	21,048	27,162
Total.....	1,361,985	5,939,297	1,632,499	5,899,047	1,318,836	6,202,009	1,203,872	5,564,657

Bureau of Agricultural Economics. Official sources except as otherwise noted. The class called here "Oil cake and oil-cake meal" includes the edible cake and meal remaining after making oil from such products as cotton seed, flaxseed, peanuts, corn, etc. Soybean cake is not included in this table.

<sup>1</sup> Preliminary.<sup>2</sup> 3-year average.<sup>3</sup> Java and Madura only

Year ending June 30

TABLE 450.—*Tea: International trade, average 1925-1929, annual 1927-1930*

Country	Calendar year									
	Average 1925-1929		1927		1928		1929		1930 <sup>1</sup>	
	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports	Ex-ports	Im-ports
<b>PRINCIPAL EXPORTING COUNTRIES</b>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>
British India.....	374,848	8,200	375,949	7,839	364,686	10,104	388,488	8,401	305,344	8,660
Ceylon.....	228,444	1,227	238	2,236	719	1,251	490	31	243,107	—
Dutch East Indies.....	124,947	8,434	127,292	7,995	135,058	9,330	139,930	9,123	116,835	7,800
China.....	116,300	8,214	114,661	8,809	123,150	13,030	125,695	5,010	91,368	3,029
Japan.....	24,631	1,009	23,487	882	24,004	1,027	23,600	1,244	20,316	1,152
Formosa.....	20,431	66	22,156	83	18,893	71	17,668	92	—	—
<b>Total.....</b>	<b>879,601</b>	<b>25,994</b>	<b>890,573</b>	<b>25,610</b>	<b>902,510</b>	<b>33,632</b>	<b>946,936</b>	<b>28,931</b>	<b>836,960</b>	<b>20,641</b>
<b>PRINCIPAL IMPORTING COUNTRIES</b>										
United Kingdom.....	0 429,507	0	451,415	0 418,831	0	464,145	0	452,764	0	84,926
United States.....	0 93,052	0	89,169	0 89,824	0	89,373	0	89,373	0	—
Australia <sup>2</sup> .....	0 49,242	0	49,672	0 49,076	0	50,576	0	50,576	0	—
Russia.....	0 43,287	0	33,741	0 64,590	0	63,029	0	53,411	0	—
Canada.....	0 38,268	0	38,117	0 39,527	0	38,677	0	50,886	0	—
Netherlands.....	29 26,144	28	27,694	26 28,186	40	28,716	93	20,587	0	—
Irish Free State.....	0 23,220	0	23,667	0 22,649	0	23,580	0	23,902	0	—
Persia <sup>3</sup> .....	742 14,925	470	13,090	161 15,062	506	16,280	—	—	—	—
Morocco.....	0 12,770	0	11,333	0 12,524	0	16,788	0	12,688	0	—
New Zealand.....	0 11,159	0	10,825	0 11,149	0	12,061	0	10,178	0	—
Union of South Africa.....	218 11,122	253	11,812	239 11,585	261	12,095	83	12,332	0	—
Germany.....	0 11,037	0	11,409	0 11,786	0	12,723	0	13,320	0	—
Egypt.....	259 10,814	233	8,605	291 14,318	248	13,093	97 <sup>4</sup>	12,200	0	—
British Malaya.....	1,323 10,491	1,239	10,778	1,326 9,973	1,217	11,378	925	9,094	0	—
Chile.....	4 5,156	0	4,653	5 5,767	8	5,700	—	4,908	0	—
Indo-China.....	2,164 4,827	1,711	5,071	2,065 5,098	2,232 <sup>5</sup>	4,313	—	—	0	—
Poland.....	15 4,428	1	4,621	0 5,025	73	4,839	7	4,533	0	—
Argentina.....	0 3,867	0	4,101	0 4,211	0	4,213	0	3,874	0	—
France.....	82 3,456	48	3,022	57 3,352	69	3,494	38	3,278	0	—
Algeria.....	15 2,140	1	1,714	27 2,513	21	2,650	—	2,647	0	—
Czechoslovakia.....	3 1,492	2	1,455	1 1,597	1	1,606	0	1,305	0	—
Denmark.....	0 1,276	0	1,261	0 1,340	0	1,267	0	1,215	0	—
Austria.....	1 1,236	0	1,278	1 1,360	2	1,430	2	1,150	0	—
Yugoslavia.....	0 869	0	769	0 902	0	913	2	647	0	—
Hungary.....	5 777	0	884	0 902	0	836	0	686	0	—
<b>Total.....</b>	<b>4,800</b>	<b>814,562</b>	<b>3,992</b>	<b>820,146</b>	<b>4,199</b>	<b>831,747</b>	<b>4,678</b>	<b>883,775</b>	<b>1,247</b>	<b>700,153</b>

Bureau of Agricultural Economics. Official sources except where otherwise noted. These figures are for tea leaves only; tea dust and sweepings and yerbe maté are not included.

<sup>1</sup> Preliminary.

<sup>2</sup> International Yearbook of Agricultural Statistics.

<sup>3</sup> Java and Madura only.

<sup>4</sup> Year ending March 20 of following year.

<sup>5</sup> Includes yerbe maté and imitation tea.

TABLE 451.—*Copra and coconut oil: International trade, average 1925-1929, annual 1928-1930*

## COPRA

Country	Calendar year							
	Average 1925-1929		1928		1929		1930 <sup>1</sup>	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
PRINCIPAL EXPORTING COUNTRIES	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
Dutch East Indies.....	851,387	6	971,900	3	1,007,214	22	828,306	409
Philippine Islands.....	409,191	1,017	516,795	2,273	382,658	1,975	384,263	964
British Malaya.....	386,704	169,135	409,602	195,395	444,949	192,506	429,417	200,198
Ceylon.....	239,555	502	231,386	346	228,759	1,656	203,011	—
Fiji.....	62,601	0	62,601	0	74,428	0	53,496	0
Solomon Islands <sup>2</sup> .....	48,372	0	52,097	0	47,678	0	—	0
Mozambique.....	40,469	0	41,685	0	44,124	0	—	0
Zanzibar.....	35,278	11,060	34,704	13,740	37,416	11,367	28,668	10,926
Tonga.....	32,048	0	35,103	0	37,769	0	—	0
Samoa, West.....	30,170	0	35,815	0	28,990	0	—	0
Tanganyika.....	17,685	0	20,672	0	17,441	0	—	0
Trinidad and Tobago.....	16,331	1,193	21,852	220	23,980	2,298	21,891	1,898
Gilbert and Ellice Islands <sup>3</sup> .....	10,482	0	10,524	0	9,288	0	—	0
Total.....	2,181,262	182,903	2,434,436	211,677	2,384,937	208,824	1,949,052	214,890
PRINCIPAL IMPORTING COUNTRIES	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
United States.....	0	469,115	0	501,990	0	570,913	0	595,338
Germany.....	777	442,523	16	442,593	1,544	539,130	25	332,356
France.....	145	364,155	40	405,174	628	421,130	64	437,616
Netherlands.....	791	308,530	689	302,201	1,617	309,245	945	213,463
United Kingdom.....	0	124,434	0	89,494	0	147,403	0	150,630
Denmark.....	0	122,840	0	133,386	0	154,339	0	154,068
Australia <sup>1</sup> .....	0	71,419	0	66,238	0	60,554	0	—
Italy.....	9	61,352	5	58,616	8	78,012	11	71,183
Norway.....	0	43,568	0	45,994	0	52,430	0	69,888
Austria.....	6	28,765	0	29,639	0	27,905	0	27,568
Sweden.....	0	24,518	0	21,462	0	12,026	0	8,758
Belgium.....	113	18,169	101	13,628	50	24,009	37	18,010
Latvia.....	0	3,496	0	3,655	0	4,993	0	5,121
British India.....	1,264	2,926	226	3,736	271	341	204	1,304
Total.....	3,125	2,085,810	1,077	2,117,096	4,118	2,402,430	1,286	2,085,553

## COCONUT OIL

PRINCIPAL EXPORTING COUNTRIES	1925-29	1928	1929	1930 <sup>1</sup>
Philippine Islands.....	308,190	0	313,589	0
Netherlands.....	121,614	9,639	124,479	3,199
Ceylon.....	78,807	13	87,261	10
Dutch East Indies.....	42,689	10,562	72,634	9,342
Germany.....	33,181	11,254	41,985	13,791
France.....	29,644	10,076	30,185	7,276
British India.....	20,223	58	22,154	13
Australia <sup>1</sup> .....	398	250	295	214
Total.....	634,752	41,852	692,552	33,845
PRINCIPAL IMPORTING COUNTRIES	1925-29	1928	1929	1930 <sup>1</sup>
United States.....	21,691	294,849	24,653	290,637
United Kingdom.....	7,473	105,560	9,072	141,142
Belgium <sup>4</sup> .....	5,924	34,156	6,631	34,017
Sweden.....	3,365	32,563	2,791	37,497
Denmark.....	25,414	27,069	33,420	28,531
British India.....	1,087	12,054	709	21,014
Egypt.....	1	11,470	2	11,502
Italy <sup>4</sup> .....	102	8,724	138	12,338
Rumania.....	2	1,553	0	—
New Zealand.....	0	896	0	814
Canada.....	0	739	0	656
Portuguese India <sup>1</sup> .....	2	50	0	8
Total.....	65,011	529,683	77,416	573,156

Bureau of Agricultural Economics. Official sources except where otherwise noted.

<sup>1</sup> Preliminary.<sup>2</sup> International Yearbook of Agricultural Statistics.<sup>3</sup> Year ending June 30.<sup>4</sup> 2-year average.<sup>5</sup> Includes some other oils.

# FARM BUSINESS AND RELATED STATISTICS

TABLE 452.—Crop summary: Acreage, production, and yield per acre, 1929-1931

Crop	Acreage			Unit	Production			Yield per acre		
	1929	1930	1931		1929	1930	1931	1929	1930	1931
	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 acres</i>		<i>Thousands</i>	<i>Thousands</i>	<i>Thousands</i>			
Corn.....	97,800	100,743	104,970	Bushel..	2,535,386	2,060,185	2,556,863	25.9	20.4	24.4
All wheat.....	62,671	61,138	54,949	do.....	812,573	858,160	892,271	13.0	14.0	16.2
Oats.....	38,148	39,729	39,722	do.....	1,118,414	1,277,764	1,112,142	29.3	32.2	28.0
Barley.....	13,523	12,663	11,471	do.....	280,242	304,601	198,965	20.7	24.1	17.3
Rye.....	3,054	3,543	3,143	do.....	34,950	45,379	32,746	11.4	12.8	10.4
Buckwheat.....	627	573	602	do.....	8,092	6,962	8,875	13.9	12.2	17.7
Flaxseed.....	3,047	3,732	2,313	do.....	15,910	21,240	11,018	5.2	5.7	4.8
Rice (4 States).....	860	959	970	do.....	40,604	46,299	45,014	47.2	46.2	46.4
Grain sorghums.....	6,131	6,586	7,152	do.....	81,041	64,416	104,529	13.2	9.8	14.6
Hay, tame.....	55,019	52,622	53,449	Ton.....	76,114	63,468	64,233	1.38	1.21	1.20
Hay, wild.....	13,586	13,793	11,977	do.....	11,194	10,751	8,133	.82	.78	.68
All hay.....	68,605	66,415	65,426	do.....	87,308	74,214	72,366	1.27	1.12	1.11
Sweet sorghum (forage and hay) <sup>1</sup> .....	1,850	1,818	2,333	do.....	3,253	2,760	3,676	1.76	1.52	1.58
Clover seed (red and alsike).....	1,789	1,076	885	Bushel..	2,627	1,523	1,222	1.47	1.42	1.38
Sweet clover seed.....	276	219	218	do.....	1,167	848	760	4.24	3.88	3.48
Lespedeza seed.....	52	42	56	do.....	199	128	238	3.78	3.07	4.22
Alfalfa seed.....	401	420	354	do.....	982	1,145	853	2.45	2.73	2.41
Timothy seed.....	407	428	483	do.....	1,878	1,740	2,046	3.39	4.06	4.24
Beans, dry edible.....	1,836	2,091	1,860	Bag <sup>2</sup> .....	12,240	13,759	12,705	\$ 11.2	\$ 11.0	\$ 11.5
Soybeans <sup>4</sup> .....	886	1,162	1,271	Bushel..	11,944	15,416	18,885	13.5	13.3	14.9
Cowpeas <sup>4</sup> .....	611	674	1,016	do.....	5,479	5,922	10,468	9.0	8.8	10.3
Velvet beans.....	1,219	1,201	1,044	Ton.....	543	470	332	\$ 891	\$ 783	\$ 732
Peanuts.....	2,001	1,862	2,172	Pound..	1,341,416	1,178,700	1,554,410	670	632	716
Potatoes.....	2,978	3,038	3,382	Bushel..	329,134	333,210	376,248	110.5	109.7	111.3
Sweetpotatoes.....	646	648	778	do.....	64,963	53,603	62,904	100.6	82.8	80.9
Tobacco.....	1,987	2,101	2,020	Pound..	1,537,193	1,636,210	1,610,098	774	778	797
Cotton.....	45,793	45,091	40,495	Bale.....	14,828	13,932	16,918	\$ 155.0	\$ 147.7	\$ 200.1
Cottonseed.....				Ton.....	6,590	6,185	7,528			
Broomcorn.....	310	391	309	do.....	47	50	49	\$ 305	\$ 255	\$ 310
Hops.....	24	20	21	Pound..	33,195	23,447	25,852	1,360	1,202	1,208
Pecans.....				do.....	51,388	46,469	74,985			
Sugar beets.....	688	776	720	Ton.....	7,315	9,199	7,933	10.6	11.9	11.0
Sugarcane (La.).....	186	187	188	do.....	3,423	3,101	2,760	18.4	16.6	14.7
Cane sirup.....	104	104	104	Gallon..	19,335	16,534	14,859	185.9	161.9	142.9
Sorgho sirup.....	150	165	259	do.....	9,256	8,916	17,818	61.7	54.0	68.8
Maple sugar.....	\$ 12,906	\$ 13,113	\$ 22,218	Pound..	1,844	2,430	1,653	7.10	7.19	7.14
Maple sirup.....	\$ 12,906	\$ 13,113	\$ 12,218	Gallon..	2,846	3,635	2,157	7.18	7.28	7.18
Fruit crops:										
Apples, total.....				Bushel..	135,622	155,982	211,506			
Apples, commercial.....				do.....						
Peaches, total.....				Barrel..	28,843	33,668	34,732			
Pears, total.....				do.....	45,020	\$ 53,864	\$ 77,743			
Grapes, total <sup>6</sup> .....				Ton.....	21,172	\$ 25,540	\$ 23,098			
Cherries (10 States).....				do.....	2,080	\$ 2,439	\$ 1,583			
Plums and prunes fresh (4 States).....				do.....	93	115	108			
Prunes, dried (4 States).....				do.....	117	148	\$ 118			
Oranges (7 States).....				do.....	161	\$ 296	204			
Grapefruit (4 States).....				Box.....	34,034	54,559	50,814			
Lemons (Calif.).....				do.....	11,095	18,690	14,770			
Cranberries.....	29	28	28	Barrel..	5,900	7,950	8,000			
Commercial truck crops:					549	560	661	19.2	20.2	23.5
Artichokes.....	9	8	8	Box.....	988	1,011	818	111	124	109
Asparagus <sup>10</sup> .....	92	97	103	Crates..	9,472	10,524	9,307	103	108	91
Beans, Lima.....	5	10	8	Bushel..	248	587	549	75	59	66
Beans, snap <sup>10</sup> .....	156	139	168	Ton.....	200	214	184	1.25	1.13	1.10
Beets.....	9	10	11	Bushel..	1,445	1,903	2,434	164	192	223
Cabbage <sup>10</sup> .....	143	149	146	Ton.....	1,086	998	993	7.25	6.70	6.80
Cantaloupes.....	109	129	138	Crates..	17,393	15,951	17,962	160	123	130
Carrots <sup>10</sup> .....	27	28	30	Bushel..	10,225	10,662	11,833	383	381	390
Cauliflower.....	25	28	28	Crates..	6,797	5,843	7,087	271	212	254
Celery.....	32	34	33	do.....	9,418	10,410	9,760	304	307	306

See footnotes at end of table.

TABLE 452.—Crop summary: Acreage, production, and yield per acre, 1929-1931—Continued

Crop	Acreage			Production			Yield per acre			
	1929	1930	1931	Unit	1929	1930	1931	1929	1930	1931
	1,000 acres	1,000 acres	1,000 acres		Thou- sands	Thou- sands	Thou- sands			
Corn, sweet <sup>11</sup> .....	379	399	374	Ton.....	743	699	808	1.96	1.75	2.16
Cucumbers <sup>10</sup> .....	122	174	138	Bushel.....	8,635	13,842	10,757	71	80	78
Eggplant.....	3	4	4	do.....	688	798	775	232	222	207
Kale.....	2	2	2	do.....	810	738	480	450	410	200
Lettuce.....	139	173	177	Crate.....	20,220	19,591	18,569	145	113	105
Onions.....	87	83	77	Bushel.....	25,489	26,002	18,557	292	313	246
Peas, green <sup>10</sup> .....	301	348	309	Ton.....	294	354	248	1.98	1.02	.80
Peppers.....	15	17	19	Bushel.....	3,425	3,690	4,623	222	213	248
Pimientos.....	9	9	7	Ton.....	19,350	15,340	9,080	2.15	1.72	1.37
Potatoes, early.....	269	325	347	Bushel.....	34,839	43,551	46,381	130	134	134
Spinach <sup>10</sup> .....	68	56	57	Ton.....	247	152	172	3.62	2.72	2.99
Strawberries <sup>10</sup> .....	203	178	154	Crate <sup>12</sup> .....	13,810	9,637	11,286	67.9	54.2	73.1
Tomatoes <sup>10</sup> .....	461	560	448	Ton.....	1,982	2,217	1,476	4.30	3.96	3.29
Watermelons.....	217	235	239	Number.....	70,056	82,401	75,509	323	350	316
Total truck crops (except pota- toes).....	2,616	2,920	2,678							
For market (ex- cept potatoes).....	1,469	1,590	1,606							
For manufacture.....	1,147	1,330	1,072							
Total all crops with dupli- cations elimi- nated.....	357,827	359,927	350,672							

Bureau of Agricultural Economics. Estimates of the crop-reporting board.

<sup>1</sup> Not included in tame hay.<sup>2</sup> 100-pound bags.<sup>3</sup> Bushels of 60 lbs.<sup>4</sup> Total except hay.<sup>5</sup> Pounds.<sup>6</sup> Trees tapped.<sup>7</sup> Per tree.<sup>8</sup> Includes some quantities not harvested.<sup>9</sup> Production is the total for fresh fruit, juice, and raisins.<sup>10</sup> Includes production used for canning or manufacture.<sup>11</sup> Mainly for canning but includes also market for New Jersey.<sup>12</sup> Crates containing 24 quarts.TABLE 453.—Indexes of the volume of net agricultural production,<sup>1</sup> 1919-1931

[1919-1927=100]

Year	Grains	Fruits and vege- tables	Truck crops	Meat animals	Dairy products	Poultry products	Cotton and cot- tonseed	Total
	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.
1919	101	82	71	96	81	85	91	91
1920	116	102	86	92	80	84	105	97
1921	100	76	74	91	91	95	64	87
1922	100	109	101	97	95	98	77	95
1923	97	108	99	107	103	107	80	101
1924	100	106	111	108	109	100	108	106
1925	98	98	115	102	110	107	108	106
1926	93	116	114	103	114	111	143	111
1927	87	104	120	108	116	116	108	108
1928	106	122	124	105	119	112	114	111
1929	87	102	141	105	122	116	118	109
1930	85	112	137	99	122	119	113	107
1931	85	116	132	100	122	121	131	111

Bureau of Agricultural Economics.

<sup>1</sup> These indexes are based on estimates of production for sale and for consumption in the farm home. Production fed to livestock or used for seed is not included. For example, instead of total production, only the amounts of corn and oats shipped out of county where grown and only a small percentage of the hay crops are included. The index of dairy products represents total milk production for all purposes. Production of meat animals is represented by total slaughter, including slaughter for farm use. Calendar-year production of livestock and livestock products are here compared with crop production of the same year. Each group index as well as the total is obtained by multiplying the yearly quantities by a 1919-1927 average farm price received by producers for each of the commodities, and the sum of these yearly values at average prices, divided by the corresponding average sum for the period 1919-1927, taken as 100. The following commodities included in the index contribute about 90 per cent of the gross income from agricultural production: Grains—wheat, corn, oats, barley, rye, buckwheat, kafir, rice; fruits and vegetables—grapes, apples, apricots, peaches, pears, cranberries, figs, grapefruit, lemons, olives, oranges, potatoes, sweetpotatoes, dry edible beans; truck crops—asparagus, snap beans, cabbage, cantaloupes, cauliflower, celery, cucumbers, lettuce, onions, peas, spinach, strawberries, tomatoes, watermelons; meat animals—cattle, calves, sheep, lambs, hogs; dairy products—milk total production; poultry products—chickens and eggs; cotton and cottonseed; total includes also tobacco, wool, and hay.

<sup>2</sup> Preliminary.

TABLE 454.—*Acreage of 52 crops and value of 75 crops, by States, 1929, 1930, and 1931*

State and division	Acreage of 52 crops			Value of 75 crops <sup>1</sup>		
	1929	1930	1931	1929	1930	1931
	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 acres</i>	<i>1,000 dollars</i>	<i>1,000 dollars</i>	<i>1,000 dollars</i>
Maine.....	1,354	1,336	1,332	79,077	45,804	24,013
New Hampshire.....	392	383	377	9,447	8,997	6,067
Vermont.....	1,078	1,062	1,067	23,672	22,207	17,733
Massachusetts.....	440	425	421	28,862	24,787	19,382
Rhode Island.....	51	49	48	2,008	2,320	1,065
Connecticut.....	384	357	347	27,130	25,440	17,281
New York.....	6,727	6,524	6,496	195,997	179,748	126,085
New Jersey.....	711	707	694	51,024	50,214	34,088
Pennsylvania.....	6,299	6,263	6,219	184,702	162,557	123,796
North Atlantic.....	17,415	17,106	17,001	602,519	522,083	370,649
Ohio.....	9,760	9,708	9,975	228,323	167,371	145,100
Indiana.....	10,088	10,264	10,372	201,612	153,970	100,649
Illinois.....	13,477	13,529	13,716	386,840	272,949	195,585
Michigan.....	7,807	7,371	7,444	169,884	145,755	97,826
Wisconsin.....	9,606	9,672	9,484	225,548	198,897	121,778
Minnesota.....	18,274	18,376	18,703	311,976	231,340	146,761
Iowa.....	22,203	22,430	22,168	501,671	372,138	224,513
Missouri.....	12,960	13,197	13,366	226,008	148,872	126,958
North Dakota.....	21,724	21,287	15,624	188,768	121,507	52,484
South Dakota.....	17,682	18,220	14,850	186,672	116,062	41,728
Nebraska.....	21,345	21,908	21,880	328,350	244,580	140,046
Kansas.....	24,145	24,600	25,056	307,222	190,936	163,079
North Central.....	193,471	195,462	187,838	3,262,564	2,373,986	1,566,401
Delaware.....	383	386	385	14,617	11,012	8,414
Maryland.....	1,691	1,673	1,672	62,590	41,072	39,480
Virginia.....	3,752	3,671	3,534	145,383	84,020	78,263
West Virginia.....	1,478	1,373	1,448	43,138	25,569	27,043
North Carolina.....	6,241	6,364	6,378	267,955	213,647	136,496
South Carolina.....	4,672	4,771	4,731	141,068	118,993	71,438
Georgia.....	9,461	9,453	9,558	228,078	179,422	101,898
Florida.....	1,379	1,419	1,487	111,590	124,482	86,485
South Atlantic.....	29,057	29,110	29,493	1,005,319	798,817	549,517
Kentucky.....	5,204	4,066	5,340	172,212	97,616	102,497
Tennessee.....	6,048	5,985	6,151	179,222	112,079	89,091
Alabama.....	7,568	7,945	8,143	194,099	139,392	88,908
Mississippi.....	6,756	6,787	7,008	252,187	129,209	97,913
Arkansas.....	6,806	6,874	6,927	204,289	84,681	107,844
Louisiana.....	4,471	4,428	4,451	154,678	101,616	81,883
Oklahoma.....	15,552	14,838	15,622	242,316	126,613	108,328
Texas.....	31,398	31,765	32,442	595,090	410,992	304,659
South Central.....	83,863	83,688	86,084	1,994,673	1,202,198	981,723
Montana.....	7,755	7,759	4,944	88,635	57,858	32,751
Idaho.....	3,024	3,012	2,851	99,610	74,959	49,076
Wyoming.....	1,993	2,044	1,784	33,159	20,951	16,067
Colorado.....	6,640	7,046	6,563	130,676	120,717	61,081
New Mexico.....	1,460	1,378	1,631	35,243	19,955	18,150
Arizona.....	483	516	480	39,090	27,443	16,516
Utah.....	1,122	1,171	1,115	33,263	26,873	20,027
Nevada.....	393	393	240	9,991	6,506	8,152
Washington.....	3,442	3,479	3,575	143,338	102,141	70,070
Oregon.....	2,679	2,644	2,577	89,278	60,047	44,094
California.....	5,029	5,119	4,596	520,206	398,315	316,076
Western.....	34,020	34,561	30,256	1,223,419	921,765	654,580
United States.....	357,827	359,927	350,672	8,088,494	5,818,849	4,122,850

BUREAU OF AGRICULTURAL ECONOMICS, UNITED STATES DEPARTMENT OF AGRICULTURE

<sup>1</sup> Values are based upon Dec. 1 prices or seasonal prices to December and differ from prices used in Tables 455 and 456.

# FARM BUSINESS AND RELATED STATISTICS

889

TABLE 455.—*Farm value, gross income, and cash income from farm production, average, 1924-1928 and 1930*

State	Farm value <sup>1</sup>				Gross income <sup>2</sup>			
	Crops		Livestock and livestock products		Crops		Livestock and livestock products	
	Average, 1924-1928	1930	Average, 1924-1928	1930	Average, 1924-1928	1930	Average, 1924-1928	1930
	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars
Maine.....	76,866	67,662	31,741	31,324	49,518	46,034	31,135	30,522
New Hampshire.....	22,033	18,158	19,765	21,270	11,866	10,870	19,311	20,539
Vermont.....	41,126	34,979	39,887	41,767	18,065	15,060	38,930	40,624
Massachusetts.....	50,422	46,182	41,989	44,814	34,939	34,313	40,490	43,658
Rhode Island.....	5,352	4,494	6,540	7,406	3,457	3,213	6,279	7,239
Connecticut.....	38,925	37,281	33,798	37,167	26,134	27,283	32,786	36,000
New York.....	295,342	260,187	254,075	261,828	165,141	146,601	243,421	252,864
New Jersey.....	77,198	71,673	46,516	45,711	60,936	58,498	44,737	44,714
Pennsylvania.....	272,103	228,724	209,660	216,632	130,877	106,276	203,480	213,918
Ohio.....	319,435	213,727	274,271	240,254	146,000	88,388	268,537	239,137
Indiana.....	203,787	179,811	233,678	218,031	110,895	74,058	229,671	214,394
Illinois.....	495,909	321,769	353,515	324,128	245,044	154,701	352,707	319,864
Michigan.....	245,381	188,750	184,445	166,772	123,295	90,483	178,053	163,957
Wisconsin.....	295,478	241,649	329,260	309,699	84,880	69,330	321,731	297,098
Minnesota.....	346,961	245,454	317,324	305,675	134,166	84,606	308,010	298,652
Iowa.....	524,332	354,453	561,076	535,069	138,273	83,031	565,485	518,243
Missouri.....	329,091	180,276	291,937	261,122	127,094	70,964	292,481	258,976
North Dakota.....	269,631	139,894	84,026	81,100	177,782	77,125	82,760	74,136
South Dakota.....	198,725	124,016	154,068	155,243	75,780	40,803	167,720	147,839
Nebraska.....	345,849	250,997	288,324	287,020	134,304	96,895	292,704	280,499
Kansas.....	371,062	220,320	238,690	239,351	210,708	111,301	237,615	231,069
Delaware.....	18,261	13,927	9,114	9,074	12,162	9,587	8,711	8,971
Maryland.....	81,494	52,051	44,369	45,541	52,114	33,269	42,140	44,516
Virginia.....	198,318	123,844	83,990	77,407	131,373	85,750	82,435	77,580
West Virginia.....	81,761	50,868	50,186	46,894	41,251	29,267	49,393	47,849
North Carolina.....	373,622	272,128	77,916	67,561	294,537	199,700	77,996	65,435
South Carolina.....	183,605	145,582	36,004	30,649	142,732	104,252	37,005	30,386
Georgia.....	291,234	235,338	74,889	63,519	207,842	160,722	75,834	62,837
Florida.....	109,062	122,238	20,952	19,887	93,769	109,053	22,073	20,685
Kentucky.....	220,474	133,729	114,494	87,064	118,675	86,679	113,479	92,005
Tennessee.....	226,224	157,778	95,213	81,208	137,045	92,060	95,426	80,921
Alabama.....	251,526	174,008	57,582	48,038	186,706	125,628	57,934	48,450
Mississippi.....	205,172	149,391	53,255	48,115	214,584	117,905	53,436	45,847
Arkansas.....	239,184	110,969	60,127	44,109	183,614	85,880	59,396	45,928
Louisiana.....	166,427	117,230	32,499	27,962	134,669	94,147	32,467	27,119
Oklahoma.....	326,779	143,098	114,637	108,104	240,298	87,204	109,139	101,710
Texas.....	780,789	464,071	228,578	214,290	623,128	324,385	225,343	207,311
Montana.....	123,024	64,688	70,740	66,166	75,087	29,924	68,221	62,817
Idaho.....	101,058	83,771	54,554	49,411	64,306	53,158	53,482	46,090
Wyoming.....	31,519	20,674	41,420	38,408	13,286	13,737	39,508	34,176
Colorado.....	126,936	123,615	79,540	78,562	77,581	78,445	79,827	76,704
New Mexico.....	30,352	21,300	34,455	29,780	20,054	13,803	36,704	27,879
Arizona.....	38,079	38,624	22,365	22,042	30,354	31,315	26,879	18,009
Utah.....	42,747	35,176	38,102	33,861	23,781	20,405	37,467	32,589
Nevada.....	9,137	7,667	16,433	11,687	2,976	2,304	17,243	11,619
Washington.....	155,371	128,689	73,787	76,885	117,171	96,461	71,426	73,870
Oregon.....	95,503	82,103	67,708	63,253	64,811	54,001	66,750	60,200
California.....	484,073	455,603	185,471	194,079	412,589	397,290	182,739	189,248
United States.....	9,942,938	6,964,022	5,833,858	5,514,038	5,928,638	4,031,026	5,770,554	5,370,013

See footnotes at end of table.

TABLE 455.—*Farm value, gross income, and cash income from farm production, average, 1924-1928 and 1930—Continued.*

State	Gross income <sup>2</sup>		Cash income <sup>3</sup>					
	Crops and livestock combined		Crops		Livestock and livestock products		Crops and livestock combined	
	Average, 1924-1928	1930	Average, 1924-1928	1930	Average, 1924-1928	1930	Average, 1924-1928	1930
	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars
Maine.....	80, 683	76, 556	41, 638	39, 100	24, 362	24, 735	66, 000	63, 885
New Hampshire.....	30, 067	31, 709	8, 003	7, 961	18, 800	18, 613	24, 803	25, 674
Vermont.....	64, 996	55, 674	10, 956	10, 675	35, 594	37, 243	40, 549	47, 818
Massachusetts.....	75, 429	77, 971	29, 845	29, 512	35, 327	39, 051	64, 672	68, 065
Rhode Island.....	9, 736	10, 452	2, 866	2, 728	6, 596	6, 593	8, 402	9, 311
Connecticut.....	53, 920	63, 283	22, 084	23, 620	28, 354	32, 254	50, 435	56, 184
New York.....	408, 561	399, 465	140, 725	125, 620	214, 037	226, 948	354, 762	352, 568
New Jersey.....	105, 673	103, 212	56, 491	54, 550	39, 417	40, 021	95, 907	94, 671
Pennsylvania.....	334, 356	320, 194	98, 214	75, 826	164, 398	179, 953	262, 612	255, 779
Ohio.....	414, 536	327, 525	118, 103	64, 362	219, 990	198, 251	338, 093	262, 613
Indiana.....	340, 567	288, 452	93, 288	53, 608	190, 616	181, 353	284, 004	239, 891
Illinois.....	597, 752	474, 565	223, 420	135, 735	303, 047	277, 724	526, 406	413, 459
Michigan.....	301, 348	254, 440	98, 640	69, 112	149, 254	139, 079	247, 894	208, 191
Wisconsin.....	406, 661	366, 428	60, 599	47, 794	292, 791	271, 942	353, 390	319, 736
Minnesota.....	442, 176	378, 268	115, 530	67, 471	272, 132	262, 552	387, 661	330, 023
Iowa.....	703, 758	601, 274	118, 700	65, 483	518, 824	478, 265	637, 524	543, 748
Missouri.....	419, 575	329, 840	97, 470	46, 785	239, 528	211, 293	336, 998	262, 078
North Dakota.....	280, 542	151, 261	172, 716	72, 296	65, 101	59, 062	237, 817	131, 358
South Dakota.....	233, 500	188, 642	71, 046	35, 948	140, 630	132, 748	211, 676	168, 696
Nebraska.....	427, 007	377, 394	125, 502	89, 268	265, 259	255, 639	390, 761	344, 907
Kansas.....	448, 323	342, 370	200, 452	102, 046	204, 373	200, 192	404, 825	303, 138
Delaware.....	20, 873	18, 558	10, 596	8, 176	7, 077	7, 489	17, 674	15, 665
Maryland.....	94, 254	77, 785	44, 592	26, 933	32, 197	35, 474	76, 789	62, 407
Virginia.....	213, 808	163, 330	103, 244	61, 296	47, 470	48, 024	150, 714	109, 320
West Virginia.....	90, 644	77, 146	25, 341	15, 687	31, 704	32, 308	57, 045	47, 995
North Carolina.....	372, 583	265, 135	256, 403	166, 394	29, 692	24, 192	286, 098	190, 586
South Carolina.....	179, 737	134, 638	121, 619	85, 433	10, 481	8, 683	132, 100	94, 116
Georgia.....	283, 675	223, 569	175, 692	132, 925	27, 298	24, 725	202, 990	167, 650
Florida.....	115, 842	129, 738	88, 026	104, 394	15, 494	14, 891	103, 520	119, 285
Kentucky.....	232, 154	178, 741	91, 625	64, 045	67, 636	57, 312	159, 561	121, 357
Tennessee.....	232, 472	172, 981	107, 322	66, 347	51, 011	45, 520	158, 333	111, 867
Alabama.....	244, 640	174, 076	158, 275	101, 804	18, 371	18, 231	176, 646	118, 019
Mississippi.....	268, 020	163, 752	191, 947	98, 608	23, 051	19, 411	214, 998	118, 019
Arkansas.....	243, 010	131, 508	180, 716	65, 684	26, 622	20, 573	197, 338	86, 457
Louisiana.....	167, 076	121, 268	124, 055	85, 177	16, 847	12, 312	140, 402	97, 489
Oklahoma.....	349, 436	188, 914	227, 179	76, 524	71, 802	70, 198	289, 981	146, 722
Texas.....	848, 472	531, 698	596, 299	301, 556	148, 536	140, 696	745, 197	442, 252
Montana.....	143, 308	92, 741	71, 883	27, 090	59, 454	55, 022	131, 467	82, 102
Idaho.....	117, 788	99, 248	61, 053	50, 559	47, 137	40, 637	108, 190	91, 196
Wyoming.....	52, 794	47, 913	12, 315	12, 906	36, 780	31, 318	49, 095	44, 224
Colorado.....	157, 409	155, 149	74, 577	75, 907	69, 509	67, 262	144, 086	143, 169
New Mexico.....	56, 758	41, 682	13, 682	12, 656	32, 277	24, 190	50, 856	36, 846
Arizona.....	57, 233	49, 324	29, 273	30, 091	24, 188	15, 429	53, 401	45, 520
Utah.....	63, 248	52, 994	23, 775	18, 653	33, 751	29, 279	57, 525	47, 932
Nevada.....	20, 219	13, 923	2, 815	2, 156	16, 180	10, 761	18, 995	12, 917
Washington.....	188, 597	170, 331	109, 844	89, 440	61, 446	64, 487	171, 291	153, 927
Oregon.....	131, 570	114, 261	58, 986	48, 917	59, 039	53, 123	118, 025	102, 040
California.....	595, 328	586, 538	405, 841	391, 630	168, 615	176, 063	574, 456	567, 693
United States.....	11, 699, 192	9, 401, 939	5, 261, 368	3, 452, 735	4, 659, 288	4, 423, 141	9, 920, 656	7, 875, 676

Bureau of Agricultural Economics.

<sup>1</sup> Commodities included are those shown in Table 452. Estimated quantities produced by States, times weighted annual prices, by States.<sup>2</sup> Estimated quantities sold and consumed in farm households, by States, times weighted annual prices by States.<sup>3</sup> Includes \$3,507,000 for sugar beets in "Other States."<sup>4</sup> Includes \$6,047,000 for sugar beets in "Other States."<sup>5</sup> Estimated quantities sold, by States, times weighted annual prices, by States; gross income equals cash income plus value of quantities consumed in farm households, times weighted annual prices.

TABLE 456.—Farm value, gross income, and cash income from farm production, United States, average 1924-1928 and 1930

Product	Farm value		Gross income		Cash income	
	Average, 1924-1928	1930	Average, 1924-1928	1930	Average, 1924-1928	1930
<b>Crops:</b>	<i>1,000 dolls.</i>	<i>1,000 dolls.</i>	<i>1,000 dolls.</i>	<i>1,000 dolls.</i>	<i>1,000 dolls.</i>	<i>1,000 dolls.</i>
Corn.....	2,252,421	1,258,313	397,030	182,178	370,828	160,433
Wheat.....	1,006,210	560,231	847,239	401,441	833,837	393,224
Oats.....	594,216	463,708	147,216	79,901	147,216	79,901
Barley.....	152,449	183,674	61,301	35,650	61,301	35,650
Rye.....	44,142	22,398	33,502	13,597	33,124	13,347
Buckwheat.....	12,591	7,470	9,564	4,900	8,680	4,107
Flaxseed.....	49,416	36,588	46,184	33,589	46,184	33,589
Rice.....	44,011	33,016	41,685	31,438	41,617	31,410
Grain sorghums.....	90,438	48,720	17,971	8,949	17,971	8,949
Emmer and spelt.....	2,486	1,527	202	117	202	117
Popcorn.....	1,816	2,304	1,816	2,304	1,816	2,304
Cotton lint.....	1,373,964	650,381	1,373,964	650,381	1,373,964	650,381
Cottonseed.....	206,510	134,182	152,923	91,576	152,923	91,576
Tobacco.....	256,201	216,895	256,201	216,895	256,201	216,895
Hay.....	1,263,914	1,054,388	200,795	151,894	200,795	151,894
Sweet sorghum forage.....	32,898	32,837	3,037	2,658	3,037	2,658
Hemp.....	144	114	114	114	114	114
Cloverseed (red and alsike).....	17,239	17,259	14,261	14,745	14,261	14,745
Sweetclover seed.....	5,496	2,323	3,971	1,653	3,971	1,653
Lespedeza seed.....	737	267	483	150	483	150
Alfalfa seed.....	9,438	9,745	8,444	9,133	8,444	9,133
Timothy seed.....	6,060	3,798	5,702	3,493	5,702	3,493
Dry edible beans.....	53,109	53,029	48,048	50,025	47,466	49,690
Soybeans.....	25,381	34,024	6,997	11,622	6,997	11,622
Cowpeas.....	32,733	21,086	4,271	3,132	2,991	2,320
Peanuts.....	61,238	41,818	37,393	21,997	36,076	21,350
Velvetbeans.....	12,983	14,532	5,086	3,263	5,086	3,263
Broomcorn.....	5,086	3,263	337,900	287,562	267,441	220,486
Polatoes, white.....	413,905	348,362	92,734	59,101	69,531	40,270
Sweetpotatoes.....	94,937	71,008	313,873	336,117	292,205	313,848
Truck crops.....	6,066	3,462	6,066	3,462	6,066	3,462
Hops.....	202,086	167,845	194,283	162,257	156,181	130,234
Apples.....	62,966	43,663	60,462	40,716	46,549	32,203
Pears.....	25,423	19,932	24,617	19,221	20,244	16,447
Cherries.....	8,075	13,940	8,075	13,940	7,436	12,814
Plums and apricots.....	10,927	6,279	10,666	6,092	6,943	3,264
Grapes.....	63,219	43,378	62,280	42,808	58,497	39,998
Other fruits and nuts.....	195,842	201,398	195,795	201,946	194,531	200,190
Strawberries.....	55,397	47,108	55,397	47,108	54,816	46,475
Small fruits.....	24,393	20,833	24,393	20,833	24,082	20,434
Cranberries.....	6,313	5,789	6,313	5,789	6,313	5,789
Pecans.....	8,955	5,939	8,955	5,939	7,714	4,995
Sugar beets, for sugar.....	54,374	65,704	54,374	65,704	54,374	65,704
Sugarcane and sirup.....	26,969	21,507	18,210	16,358	12,082	11,741
Sorghum sirup.....	25,382	19,921	18,256	13,376	7,812	5,847
Maple sugar and sirup.....	8,681	9,607	8,681	9,607	7,578	8,721
Forest products.....	314,472	299,727	314,472	299,727	182,267	173,704
Farm gardens.....	290,136	245,402	290,136	245,402	290,136	245,402
Nursery products.....	20,432	20,432	20,432	20,432	20,432	20,432
Greenhouse products.....	76,839	76,839	76,839	76,839	76,839	76,839
<b>Total.....</b>	<b>9,942,938</b>	<b>6,964,022</b>	<b>5,928,638</b>	<b>4,031,926</b>	<b>5,261,368</b>	<b>3,452,735</b>
<b>Livestock and livestock products:</b>						
Cattle and calves.....	928,688	990,023	1,003,674	937,023	974,331	905,399
Hogs.....	1,508,342	1,354,030	1,546,016	1,376,097	1,253,107	1,126,900
Sheep and lambs.....	175,224	144,342	153,162	142,173	150,026	139,111
Horses.....	41,821	35,075	14,802	9,242	14,802	9,242
Mules.....	20,062	15,433	11,422	7,150	11,422	7,150
Chickens.....	428,808	387,600	430,060	394,880	255,497	244,012
Eggs (chicken).....	698,037	652,962	669,080	626,932	511,104	490,619
Milk.....	1,919,604	1,853,756	1,829,175	1,795,699	1,380,188	1,422,212
Wool.....	94,032	65,642	94,032	65,642	94,032	65,642
Mohair.....	7,457	5,287	7,457	5,287	7,457	5,287
Honey.....	11,367	9,670	11,367	9,670	8,013	7,349
Beeswax.....	307	218	307	218	307	218
<b>Total.....</b>	<b>5,833,858</b>	<b>5,514,038</b>	<b>5,770,554</b>	<b>5,370,013</b>	<b>4,659,288</b>	<b>4,423,141</b>
<b>Grand total.....</b>			<b>11,699,192</b>	<b>9,401,939</b>	<b>9,920,656</b>	<b>7,875,876</b>

Bureau of Agricultural Economics. Estimated quantities produced, sold, and consumed in farm households times weighted annual prices. Cash income plus value of commodities consumed in farm households equals gross incomes. For feed and seed crops, horses, and mules, value includes sales by farmers in some States eventually bought by farmers in other States. These interfarm sales tend to overestimate the total income from farm production for the country as a whole.

TABLE 457.—*Gross income from farm production by groups of commodities, expenditures, income available for operators' capital, labor, and management and current value of capital employed in agriculture, United States, 1924-1930*

Item	1924	1925	1926	1927	1928	1929	1930
	<i>Million dollars</i>	<i>Million dollars</i>	<i>Million dollars</i>	<i>Million dollars</i>	<i>Million dollars</i>	<i>Million dollars</i>	<i>Million dollars</i>
<b>Crops:</b>							
Grains.....	1,755	1,496	1,432	1,502	1,513	1,281	700
Fruits and nuts.....	671	683	694	690	705	722	536
Vegetables.....	953	1,193	1,093	1,062	967	1,180	963
Sugar crops.....	104	95	103	104	92	97	105
Cotton and cottonseed.....	1,710	1,740	1,251	1,464	1,470	1,389	748
Tobacco.....	259	251	237	257	278	283	217
Other crops.....	719	689	659	649	650	657	592
Total crops.....	6,170	6,147	5,468	5,817	5,075	5,609	3,971
<b>Livestock and livestock products:</b>							
Cattle, hogs, and sheep.....	2,380	2,822	2,922	2,664	2,727	2,817	2,455
Poultry and eggs.....	989	1,114	1,167	1,108	1,202	1,254	1,037
Dairy products.....	1,678	1,759	1,805	1,911	1,994	2,109	1,798
Wool.....	87	97	88	86	111	94	66
Other.....	33	28	30	30	32	28	22
Total livestock.....	5,167	5,890	6,012	5,799	6,066	6,302	5,376
Total crops and livestock.....	11,337	11,968	11,480	11,616	11,741	11,911	9,347
<b>Operators' expenditures:</b>							
Operating costs <sup>1</sup> .....	2,541	2,888	2,727	2,740	2,968	2,977	2,724
Wages to hired labor <sup>2</sup> .....	1,206	1,219	1,241	1,234	1,228	1,231	1,011
Taxes <sup>3</sup> .....	458	459	465	475	482	490	490
Interest <sup>4</sup> .....	712	705	699	690	684	681	671
Rent <sup>5</sup> .....	927	958	809	911	916	953	701
Total deductions.....	5,844	6,229	5,941	6,050	6,278	6,332	5,597
<b>Balance available for capital, labor, and management:</b>							
Total.....	5,493	5,739	5,539	5,566	5,463	5,579	3,750
Per farm, in dollars <sup>6</sup> .....	862	903	874	880	868	887	598
<b>Capital:</b>							
Total <sup>7</sup> .....	57,718	57,861	56,754	57,256	58,141	58,130	52,747
Total operators' capital used in production <sup>8</sup> .....	27,421	27,633	26,886	27,410	28,183	28,177	24,132
Income available for operators' capital and management <sup>9</sup> .....	1,088	1,292	1,005	1,065	973	1,060	-346
Income available for operators' capital and management as per cent of operators' capital.....	<i>Per cent</i> 4.0	<i>Per cent</i> 4.7	<i>Per cent</i> 3.7	<i>Per cent</i> 3.9	<i>Per cent</i> 3.4	<i>Per cent</i> 3.8	<i>Per cent</i> -1.4

Bureau of Agricultural Economics.

<sup>1</sup> All of the operating costs indicated in Table 4, Crops and Markets, September, 1931, p. 308, except 7.5 per cent of total fertilizer costs, 9.5 per cent of feed, 10 per cent of binder twine, 15 per cent of ginning costs, and 20 per cent of repairs on buildings and insurance. These deductions are estimated as paid by non-farmer landlords.

<sup>2</sup> Estimates of cash wages and board, and 10 per cent allowance for perquisites and hired domestic labor contributing to production.

<sup>3</sup> 70 per cent of estimated total taxes on all farm real estate paid by operators, less 10 per cent to allow for taxes on farm dwellings.

<sup>4</sup> Paid on all bank loans and on 90 per cent of total farm mortgage debt held by nonfarmers, 10 per cent of the total mortgage debt being assigned to farm dwellings.

<sup>5</sup> Paid on 72 per cent of all rented farms to nonoperators.

<sup>6</sup> Estimated number of farms interpolated between 6,372,000 on Jan. 1, 1925, and 6,289,000 on Apr. 1, 1930.

<sup>7</sup> As of Dec. 31, includes land, buildings, machinery, livestock, and 1 per cent cash working capital.

<sup>8</sup> All capital used in production excluding value of farm indebtedness to nonfarmers and value of farms rented from nonfarmers. This total includes value of autos used for pleasure which probably offsets value of dwellings used for production.

<sup>9</sup> Income available for all capital, labor, and management, less wage allowance for labor of operators and families. Operators are here allowed an annual hired-hand wage without board, and family labor is taken as 22 per cent additional to the operators' labor. The value of the operator's labor is here understated in so far as hired hands receive perquisites in addition to cash and board, and it may be overstated in so far as the operator's time is not entirely spent on farm work.

TABLE 458.—Current value of agricultural capital, gross income from farm production, and selected expenditures, United States, 1909-1931

Calendar year	Current value of agricultural capital <sup>1</sup>	Gross income <sup>2</sup>	Selected expenditures						Taxes <sup>3</sup>	Interest on mortgages <sup>4</sup>
			Wages (including board) <sup>5</sup>	Feed <sup>6</sup>	Fertilizer <sup>7</sup>	Farm implements (excluding autos and trucks) <sup>8</sup>	Other farm machinery and their costs of operation <sup>9</sup>	Ginning <sup>10</sup>		
	Million dollars	Million dollars	Million dollars	Million dollars	Million dollars	Million dollars	Million dollars	Million dollars	Million dollars	Million dollars
1909	41,354	6,238	652	300	115	192	33	262	262	190
1910	42,985	6,643	674	302	137	219	39	268	268	210
1911	44,086	6,372	673	372	182	217	52	275	275	221
1912	46,081	6,784	697	336	183	244	45	278	278	232
1913	47,778	6,975	721	453	172	265	46	286	286	240
1914	47,995	7,028	696	431	188	285	56	292	292	252
1915	50,533	7,395	701	471	188	286	43	298	298	269
1916	55,041	8,914	766	638	163	357	60	304	304	299
1917	61,576	9,941	871	871	217	613	64	310	310	345
1918	67,055	16,101	1,162	1,023	297	605	61	315	315	401
1919	79,089	16,935	1,336	1,097	326	693	77	380	380	469
1920	71,791	13,666	1,567	728	359	594	91	422	422	545
1921	68,091	8,927	997	484	217	239	47	633	633	554
1922	61,494	9,944	971	568	210	281	59	678	678	564
1923	53,997	11,040	1,088	670	229	393	61	718	718	564
1924	57,713	11,837	1,074	760	231	380	62	727	727	567
1925	57,701	11,968	1,137	828	256	429	100	729	729	568
1926	56,794	11,480	1,151	734	293	464	121	738	738	568
1927	56,293	11,616	1,145	789	234	494	73	764	764	568
1928	56,140	11,741	1,147	897	273	508	88	765	765	568
1929	58,130	11,711	1,195	919	271	678	89	777	777	564
1930	57,747	9,820	1,036	835	268	450	78	777	777	564
1931 <sup>11</sup>		9,920	838	680						

Bureau of Agricultural Economics. Tentative estimates of the bureau.

<sup>1</sup> As of end of year. Includes land, buildings, machinery, livestock, and working capital (estimated at 1 per cent of other items). Interpolation between census estimates: Land and buildings based on index of land values per acre and straight line interpolation of total census in farm; livestock, annual estimates of United States Department of Agriculture; machinery, interpolated on basis of estimated values of land and buildings, 1909-1919, straight line interpolations, 1920-1924 and 1925-1930.

<sup>2</sup> 1924-1930, Table 457; 1909-1923 based on farms which represent 95 per cent of gross income in 1924-1930.

<sup>3</sup> Interpolations between census estimates, based on United States Department of Agriculture index of farm wages.

<sup>4</sup> Interpolations between census years based on an index of prices paid by farmers for feed and an index of production of feed crops. The product of the two indexes was adjusted to equal the census values of feed purchased.

<sup>5</sup> Interpolated between census estimates, based on index of value derived from total fertilizer consumption and United States Department of Agriculture index of fertilizer prices paid by farmers.

<sup>6</sup> 1909-1919, 1900, 1914, and 1919 census values of farm implements produced adjusted to represent total farm equipment sold in the United States at farm values. Interpolations for other years to 1920 based on gross income from farm production. 1920-1930 estimates based largely on factory value of farm implements sold in the United States raised to represent farm values.

<sup>7</sup> Includes estimated costs of operating automobiles, trucks, and tractors; 90 per cent of annual farm purchases of autos and trucks, and harness and saddlery.

<sup>8</sup> Annual cotton production, multiplied by ginning costs per bale.

<sup>9</sup> 1924-1930, estimates based on annual survey of tax rates per acre.

<sup>10</sup> Interpolations between total farm mortgages for 1910, 1920, 1924, 1928, 1930, using smoothed estimates for 1911-1919 derived from value of current agricultural capital, and of taxes for three States, New York, Ohio, and Kansas.

<sup>11</sup> Interpolations between total farm mortgages for 1910, 1920, 1924, 1928, 1930, using smoothed estimates for 1911-1919 derived from value of current agricultural capital, and smooth curve, 1920-1930.

TABLE 459.—*Farm returns, 1922-1930*  
 [Average of reports of owner-operators for their own farms for calendar year]

Item	United States										North Atlantic		East North Central		West North Central		South Atlantic		South Central		Western	
	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930	1929	1930
Number of reports.....	6,064	10,183	15,103	16,330	13,475	13,559	11,851	11,805	6,228	1,255	703	2,331	1,355	1,477	2,504	1,477	1,409	643	2,719	1,301	1,407	689
Size of farm.....acres	252	298	303	304	315	275	284	270	284	139	137	146	148	360	360	860	184	198	256	246	568	693
Value of farm real estate, Jan. 1.....	\$13,560	\$14,530	\$14,323	\$14,167	\$13,379	\$12,643	\$12,296	\$12,060	\$12,009	\$8,566	\$8,289	\$11,093	\$11,789	\$17,960	\$17,152	\$7,805	\$7,805	\$8,152	\$8,643	\$8,346	\$10,219	\$10,050
Value of farm personalty, Jan. 1.....	2,844	2,960	2,837	2,965	2,929	2,898	3,118	3,162	3,156	3,459	3,513	2,997	2,988	4,538	4,538	4,387	1,658	1,788	1,918	1,780	4,569	4,484
Receipts:																						
Crop sales.....	816	850	1,012	968	926	978	946	1,029	779	831	848	557	454	818	818	687	1,119	778	1,143	704	2,093	1,520
Sales of livestock.....	660	700	780	807	894	851	986	922	705	471	431	909	774	1,806	1,806	1,520	389	322	400	289	1,116	818
Sales of livestock products.....	454	500	570	585	539	638	689	681	635	1,623	1,607	920	830	508	508	452	354	352	255	233	796	713
Miscellaneous other.....	42	80	72	70	39	38	37	37	32	65	72	40	31	35	35	28	30	26	21	18	51	30
Total.....	1,972	2,240	2,434	2,551	2,448	2,505	2,608	2,669	2,211	2,990	2,968	2,426	2,089	3,267	3,267	2,887	1,894	1,478	1,909	1,334	3,996	3,081
Cash outlay:																						
Hired labor.....	331	350	384	386	386	397	394	399	378	444	494	260	265	350	350	323	410	308	359	333	758	690
Livestock bought.....	204	240	222	242	242	238	238	238	172	202	126	205	145	389	389	336	156	98	155	76	294	175
Feed bought.....	176	210	248	244	232	243	262	262	276	612	689	275	251	302	302	296	140	163	146	132	317	302
Fertilizer.....	57	60	66	69	73	64	67	79	78	124	131	63	58	113	113	130	230	231	74	90	36	35
Seed.....	43	40	44	45	45	46	46	43	43	63	64	46	44	44	44	48	33	33	33	30	46	47
Repairs on farm property.....	174	190	192	191	183	180	184	187	196	165	167	217	228	240	240	252	115	117	118	121	297	268
Machinery and tools.....	123	110	108	119	130	129	151	159	118	135	145	137	91	297	297	199	68	55	98	56	248	160
Miscellaneous other.....	150	160	161	179	179	157	176	191	191	182	210	181	163	233	233	224	108	89	103	111	397	407
Total.....	1,267	1,300	1,410	1,477	1,473	1,457	1,518	1,572	1,452	1,927	1,976	1,374	1,245	1,894	1,894	1,691	1,275	1,154	1,081	949	2,363	2,063
Receipts less cash outlay.....	715	800	1,024	1,074	975	1,048	1,090	1,097	759	1,063	982	1,052	844	1,423	1,423	996	619	324	828	355	1,633	998
Increases in inventory of personal property.....	202	130	181	223	168	242	241	201	-221	191	-100	126	-240	261	261	-401	145	-110	159	-168	361	-130
Net result.....	917	1,020	1,205	1,297	1,133	1,290	1,334	1,298	538	1,254	882	1,178	604	1,694	1,694	595	764	214	987	217	1,994	868
Interest paid.....	(1)	230	220	225	215	201	202	196	199	105	106	173	170	339	339	320	95	99	125	137	323	307
Spent for farm improvements.....	(1)	140	133	131	128	141	126	126	92	130	117	127	96	152	152	99	84	81	96	69	104	117
Value of food produced and used on the farm.....	294	285	266	274	282	273	269	262	242	267	267	266	246	252	252	249	286	266	242	220	227	219

Value of family labor, including owner <sup>1</sup> .....	716	870	789	793	779	708	708	708	772	719	914	855	845	767	918	844	492	472	503	463	914
Change in value of real estate during the year (minus sign (-) shows decrease).....	-52	-66	+145	+173	+2	+61	+72	+27	-757	+40	-158	-20	-697	-11	+5	-1,216	-526	+50	-647	+127	-938

Bureau of Agricultural Economics. Compiled from reports of individual farms operated by their owners. Division averages for 1923 in Agriculture Yearbook 1924, pp. 1131-1132; for 1923-24 in Agriculture Yearbook; 1925, pp. 1342-1343; for 1926 in Yearbook of Agriculture, 1927, pp. 1182-1183; for 1926 in Yearbook of Agriculture, 1923, pp. 1088-1089; for 1927 in Yearbook of Agriculture, 1930, pp. 972-973; for 1928-29 in Yearbook of Agriculture 1931, pp. 982-983.

<sup>1</sup> Not reported for 1922.

TABLE 460.—*Farm returns: Proportion of farmers obtaining net results within specified ranges, 1922-1930*

Item	United States												North Atlantic			East North Central			West North Central			South Atlantic			South Central			Western		
	1922			1923			1924			1925			1926			1927			1928			1929			1930			1931		
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
Number of reports.....	6,094	10,183	15,103	15,330	13,475	13,859	11,851	11,805	0,228	1,255	708	2,331	1,355	2,694	1,477	1,469	648	2,719	1,361	1,407	689	688	688	688	688	688	688	688	688	688
Size of farm.....	252	298	303	304	315	275	294	270	284	139	137	146	148	350	360	184	198	255	246	563	688	688	688	688	688	688	688	688	688	688
Value of farm property Jan. 1 per farm.....	16,430	17,400	17,200	17,122	16,308	15,486	15,417	15,243	15,165	12,025	11,799	14,000	14,777	22,488	21,539	9,553	9,040	10,581	10,120	120	20,778	20,531	508	508	508	508	508	508	508	508
Net result per farm.....	917	1,020	1,205	1,207	1,133	1,290	1,334	1,298	538	1,254	882	1,178	604	1,684	698	704	214	987	217	1,991	1,991	1,991	1,991	1,991	1,991	1,991	1,991	1,991	1,991	1,991
Proportion obtaining:																														
\$5,000 or more.....	1.77	1.88	2.69	3.00	2.26	3.19	3.12	2.94	1.03	2.31	1.60	1.64	.74	4.51	1.01	1.27	.78	1.62	.51	7.25	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32	2.32
\$4,000 to \$4,999.....	3.89	4.67	6.10	6.82	5.49	6.42	6.77	6.24	2.37	6.14	3.98	4.86	1.92	10.99	3.18	2.40	.83	3.06	1.63	10.08	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
\$3,000 to \$3,999.....	2.61	2.88	3.61	4.03	3.59	3.87	4.06	4.26	1.96	4.54	2.70	4.12	1.18	6.48	2.98	2.07	.79	2.67	.96	6.08	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63
\$2,000 to \$2,999.....	4.33	5.13	5.99	6.20	5.40	6.53	6.36	6.01	3.20	6.01	4.84	6.02	8.32	8.87	4.40	3.20	1.87	4.01	1.03	7.18	4.21	4.21	4.21	4.21	4.21	4.21	4.21	4.21	4.21	4.21
\$1,000 to \$1,999.....	7.78	8.91	9.30	9.92	9.05	9.68	10.36	10.36	6.38	12.91	7.26	13.04	6.42	12.63	6.84	6.94	2.83	4.47	1.47	11.80	8.86	8.86	8.86	8.86	8.86	8.86	8.86	8.86	8.86	8.86
\$500 to \$999.....	14.39	14,409	15,13	15,44	14,06	15,46	15,23	14,89	9.41	14.74	15.66	16.62	11.22	16.69	9.75	11.00	4.51	13.61	4.16	12.73	12.73	12.73	12.73	12.73	12.73	12.73	12.73	12.73	12.73	12.73
\$400 to \$499.....	22.82	23,07	21,86	21,79	22,10	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07	22,07
\$300 to \$399.....	27.88	28,09	24,68	23,32	25,43	23,98	23,19	24,76	29,03	23,98	23,98	23,98	23,98	23,98	23,98	23,98	23,98	23,98	23,98	23,98	23,98	23,98	23,98	23,98	23,98	23,98	23,98	23,98	23,98	23,98
\$200 to \$299.....	9.89	9.10	7.85	7.81	8.56	6.08	7.20	6.37	19.70	7.41	13.87	6.22	16.16	10.44	10.94	20.13	8.03	33.66	33.66	33.66	33.66	33.66	33.66	33.66	33.66	33.66	33.66	33.66	33.66	33.66
\$100 to \$199.....	2.36	2.07	1.57	1.54	1.69	1.28	1.04	1.01	6.54	1.70	2.42	1.70	3.89	1.61	1.61	1.07	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60	.60
\$50 to \$99.....	2.28	1.71	1.22	1.07	1.25	.95	.62	.55	4.19	.40	1.70	.17	2.44	.50	.77	1.07	.45	.45	.45	.45	.45	.45	.45	.45	.45	.45	.45	.45	.45	.45
-\$100 or more.....	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Bureau of Agricultural Economics. The reports are those tabulated in Table 459 (preceding). For distribution by geographical divisions, see Table 476, Yearbook, 1927; Table 509, Yearbook, 1928; Table 511, Yearbook, 1930, and Table 459, Yearbook, 1931.

TABLE 461.—Wheat: Cost of production by yield groups and geographical divisions, 1930

Yield group (bushels per acre) and geographical division	Reports	Average acreage in wheat per farm	Average yield per acre	Gross cost per acre							Credit per acre (straw)	Net cost	
				Prepare and plant	Harvest and thresh	Market	Fertilizer and manure	Seed	Land rent	Miscella- neous 1		Total	Per acre
Winter-wheat belt: †	Number	Acres	Bushels	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
12 and under.....	213	105	9	2.75	2.03	0.56	0.91	1.15	3.27	1.88	13.15	0.52	12.63
13 to 18.....	189	149	15	2.96	3.17	.77	.87	1.11	4.33	2.07	15.28	.37	14.91
19 to 24.....	109	84	20	2.98	3.78	.91	.85	1.16	5.05	1.87	16.00	.07	15.93
25 and over.....	87	105	29	3.17	4.51	1.07	.74	1.23	6.86	2.21	19.79	.43	19.36
Total or average.....	513	112	15	2.91	3.23	.75	.87	1.15	4.31	2.00	15.22	.50	14.72
Spring-wheat belt: ‡													
12 and under.....	148	159	9	2.89	2.45	.57	.42	1.23	2.47	2.01	12.04	.20	11.84
13 to 18.....	85	126	16	3.02	2.93	.73	.23	1.43	3.28	2.14	13.76	.18	13.58
19 and over.....	40	72	23	3.21	3.88	.94	.80	1.08	4.94	2.48	17.83	.32	17.51
Total or average.....	273	136	13	2.98	2.81	.68	.42	1.36	3.10	2.13	13.48	.21	13.27
Geographical division:													
North Atlantic.....	204	15	23	5.91	5.46	1.42	6.26	2.36	6.10	3.48	31.01	4.97	26.04
East North Central.....	502	24	20	3.84	3.99	.96	3.25	1.83	5.28	2.52	21.67	1.77	19.90
West North Central.....	821	104	16	2.95	3.17	.73	.77	1.20	4.17	2.04	15.17	.45	14.72
South Atlantic.....	833	16	17	4.23	4.44	1.33	4.26	1.82	5.27	2.07	24.07	2.62	21.45
South Central.....	131	107	12	2.84	3.30	.87	.80	1.17	4.47	1.99	15.44	.08	15.36
Western.....	343	179	22	4.13	3.85	1.09	.66	1.42	9.09	3.45	23.69	.66	23.03
United States.....	2,394	77	18	3.75	3.32	1.00	2.27	1.59	6.14	2.56	21.13	1.48	19.65

Bureau of Agricultural Economics. From returns to mail inquiry sent to crop reporters. For figures by yield groups for 7 years, 1922-1929, see Agriculture Yearbooks, 1924, p. 1138; 1925, p. 1328; 1929, p. 1210; 1927, p. 1136; 1928, p. 1041; 1930, p. 984; and 1931, p. 1015. For figures by geographical divisions for 7 years, 1922-1929 see June issues of Monthly Supplement, Crops and Markets, 1924, p. 176; 1925, p. 180; 1926, p. 170; Crops and Markets, June issues, 1927, p. 202; 1928, p. 186; 1929, p. 202; 1930, p. 220.

† Includes miscellaneous labor, irrigation (including water), seed treatment, sacks and twine, crop insurance, use of implements, use of storage buildings, and overhead.

‡ Winter-wheat belt as used here includes Kansas, Nebraska, Missouri, and Oklahoma.

§ Spring-wheat belt as used here includes western Minnesota, North Dakota, eastern South Dakota, and eastern Montana.

TABLE 462.—Corn: Cost of production by yield groups and geographical divisions, 1930

Yield group (bushels per acre) and geographic division	Reports	Average acreage in corn per farm	Average yield per acre	Gross cost per acre							Credit per acre (stover and fodder)	Net cost		
				Prepare and plant	Culti- vate	Harvest	Market	Fertiliz- er and manure	Seed	Land rent		Miscel- laneous	Total	Per acre
		Acres	Bushels	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
All reports:	7 and under	518	3	3.73	2.96	1.57	0.40	2.62	0.46	4.16	1.90	17.80	16.38	5.46
	8 to 17	974	13	3.66	2.83	2.16	.94	2.70	.42	4.84	1.89	18.93	17.08	1.42
	18 to 27	879	38	3.86	2.84	2.63	1.43	3.15	.45	6.19	2.21	21.88	19.88	.60
	28 to 37	562	48	3.96	2.81	3.25	1.67	3.31	.45	6.98	2.39	23.66	21.79	.68
	38 to 47	383	47	4.87	2.82	3.55	1.91	4.30	.56	6.76	2.39	26.64	24.69	.60
	48 to 57	176	61	4.95	3.83	4.58	2.45	5.44	.60	7.41	2.84	31.60	28.79	.66
	58 and over	94	66	5.44	3.47	5.10	3.50	7.52	.63	8.43	3.66	37.76	34.42	.52
Corn Belt: <sup>1</sup>	17 and under	272	10	3.20	2.43	1.97	.76	1.87	.37	4.29	1.59	16.48	15.28	1.53
	18 to 27	219	69	3.62	2.13	2.02	1.18	1.79	.37	5.67	1.70	18.88	17.32	.79
	28 to 37	238	65	3.69	2.32	2.76	1.40	2.04	.43	6.66	2.00	21.20	20.30	.63
	38 to 47	178	70	4.1	2.33	2.79	1.43	2.36	.50	7.84	2.08	22.90	21.97	.63
	48 to 57	79	57	4.04	2.57	3.63	1.90	2.91	.50	7.84	2.13	26.90	24.63	.48
	58 and over	32	47	4.34	2.68	4.25	2.47	4.46	.55	8.23	2.13	26.11	24.71	.48
	Total or average	1,018	57	3.68	2.34	2.61	1.29	2.14	.43	6.12	1.92	20.33	19.23	.60
Geographic division:	North Atlantic	218	29	6.71	3.88	6.14	1.98	9.67	.72	6.40	3.43	38.92	33.82	1.17
	East North Central	762	86	4.64	2.83	3.62	1.68	4.20	.63	6.50	2.39	25.08	22.82	.74
	West North Central	1,131	62	3.09	2.14	2.17	1.15	1.60	.42	6.01	1.78	17.90	16.40	.71
	South Atlantic	632	21	4.69	3.62	2.89	1.47	5.07	.46	6.43	2.31	25.74	22.48	1.12
	South Central	803	33	3.46	3.25	1.61	1.20	2.01	.42	6.10	2.01	18.06	18.02	1.26
	Western	80	30	4.24	2.79	3.06	1.96	1.54	.49	6.65	3.14	23.87	21.88	.73
	United States	3,616	39	4.03	2.91	2.78	1.37	3.41	.47	5.31	2.19	22.47	20.51	.89

Bureau of Agricultural Economics. From returns to mail inquiry sent to crop reporters. For figures by yield groups for 7 years 1923-1929, see Agriculture Yearbooks, 1924, p. 1136; 1925, p. 1332; 1926, p. 1213; 1927, p. 1139; 1928, p. 1044; 1929, p. 1044. For figures by geographical divisions for 7 years, 1923-1929, see June issues of Monthly Supplement, Crops and Markets, 1924, p. 176; 1925, p. 130; 1926, p. 170; Crops and Markets, June issues, 1927, p. 202; 1928, p. 146; 1929, p. 202, and 1930, p. 230.

Includes miscellaneous labor, irrigation (including water), seed treatment, sacks and twine, crop insurance, use of implements, use of storage buildings, and overhead.  
 Corn Belt as used here includes Indiana, Illinois, Iowa, western Ohio, southeast corner of South Dakota, eastern Nebraska, northeast corner of Kansas, and the northern three-fourths of Missouri.

Does not include reports from Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

TABLE 463.—Oats: Cost of production by yield groups and geographical divisions, 1930

Yield group (bushels per acre) and geographic division	Reports Number	Average acreage in oats per farm	Average yield per acre	Gross cost per acre							Credit per acre (straw)	Net cost		
				Prepare and plant	Harvest and thresh	Market	Fertilizer and ma- nure	Seed	Land rent	Miscel- laneous <sup>1</sup>		Total	Per acre	Per bushel
			Bushels	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
17 and under	312	22	10	2.91	2.50	0.55	1.32	1.22	3.58	1.88	13.96	0.87	13.09	1.31
18 to 22	273	22	20	2.90	3.21	.85	1.22	1.30	4.23	1.90	15.61	1.12	14.49	1.72
23 to 27	249	22	25	3.08	3.45	1.00	1.34	1.31	4.21	2.07	16.49	1.33	14.56	.58
28 to 32	412	28	30	3.03	3.71	1.04	1.22	1.28	4.64	2.18	17.10	1.35	15.75	.62
33 to 37	239	28	35	3.25	3.97	1.09	1.18	1.34	4.88	2.22	17.93	1.33	16.55	.47
38 to 42	388	27	40	3.45	4.42	1.31	1.46	1.41	5.77	2.71	20.56	1.67	18.89	.47
43 to 47	150	24	45	3.59	4.53	1.35	1.47	1.47	5.78	2.59	20.78	2.03	18.75	.43
48 to 52	206	26	50	3.60	4.74	1.60	1.68	1.39	6.30	2.77	21.98	2.13	19.85	.42
53 to 57	63	25	55	3.72	5.43	1.88	2.41	1.65	5.74	2.76	23.59	3.05	20.54	.37
58 to 62	103	24	60	3.66	5.39	1.81	1.35	1.41	6.83	2.97	23.42	2.13	21.29	.35
63 and over	65	19	74	4.18	5.56	2.06	1.28	1.78	8.55	3.65	27.06	2.47	24.59	.33
Geographic divisions:														
North Atlantic	264	13	41	5.81	5.78	1.63	3.50	2.03	5.65	3.23	27.62	4.13	23.49	.57
East North Central	621	24	37	3.19	3.33	1.12	1.40	1.21	5.37	2.54	18.96	1.86	16.80	.45
West North Central	983	34	33	2.34	3.38	1.00	.44	1.14	4.65	2.00	14.95	.83	14.12	.43
South Atlantic	304	10	26	3.88	4.26	1.28	3.07	1.70	4.90	2.27	21.41	2.02	19.39	.75
South Central	181	22	27	2.73	3.72	1.24	1.05	1.43	4.62	1.90	16.69	.92	15.77	.58
Western	173	29	30	4.29	4.58	1.25	.76	1.34	6.86	3.26	22.94	1.15	21.19	.51
United States	2,526	25	34	3.26	3.95	1.15	1.38	1.36	5.11	2.37	18.56	1.60	16.98	.59

Bureau of Agricultural Economics. From returns to mail inquiry sent to crop reporters. For figures by yield groups for 7 years, 1923-1929, see Agriculture Yearbooks, 1924, p. 1137; 1925, p. 1335; 1926, p. 1217; 1927, p. 1143; 1928, p. 1048; 1930, p. 886, and 1931, p. 1015. For figures by geographical divisions for 7 years, 1923-1929, see June issues of Monthly Supplement, Crops and Markets, 1924, p. 176; 1925, p. 180; 1926, p. 170; 1927, p. 183; 1928, p. 202; 1929, p. 202; 1930, p. 220.

<sup>1</sup> Includes miscellaneous labor, irrigation (including water), seed treatment, sacks and twine, crop insurance, use of implements, use of storage buildings, and overhead.

TABLE 404.—Cotton: Cost of production by yield groups, 1930

Yield group (pounds of lint per acre)	Reports	Average acreage in cotton per farm	Gross cost per acre										Net cost of lint	
			Prepare and plant	Culti- vate	Harvest and market	Fertil- izer and manure	Seed	Ginning	Land rent	Miscel- laneous <sup>1</sup>	Total	Credit per acre (cotton- seed)	Per acre	Per pound
	Number	Acres	Pounds	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
100 and under.....	213	58	71	3.73	3.19	2.88	1.06	0.97	4.06	2.21	22.70	1.71	20.99	0.30
101 to 180.....	285	63	145	4.97	4.42	3.81	1.05	1.56	4.79	2.55	26.66	2.54	23.72	.16
181 to 260.....	202	43	226	4.08	5.89	6.24	1.12	2.02	5.18	3.63	33.90	4.61	29.29	.13
261 to 340.....	111	72	300	4.30	5.57	7.62	1.19	2.70	5.52	3.95	38.61	5.74	32.87	.11
341 to 420.....	85	33	376	4.55	5.89	8.76	1.24	3.30	7.08	4.77	43.89	6.84	37.05	.10
421 and over.....	72	76	542	4.92	6.46	13.63	1.13	5.91	10.76	7.89	57.16	11.32	45.34	.08

Bureau of Agricultural Economics. From returns to mail inquiry sent to crop reporters in all cotton States.

<sup>1</sup> Includes miscellaneous labor, irrigation (including water), dusting, picking sacks and sheets, crop insurance, use of implements, use of storage buildings, and overhead.

TABLE 405.—Cotton: Cost of production by yield groups, 1925-1930

Yield group (pounds of lint per acre) <sup>1</sup>	Farmers reporting						Average yield of lint per acre						Net cost of lint per pound <sup>2</sup>					
	1925	1926	1927	1928	1929	1930	1925	1926	1927	1928	1929	1930	1925	1926	1927	1928	1929	1930
	Number	Number	Number	Number	Number	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Cents	Cents	Cents	Cents	Cents	Cents
100 and under.....	126	123	117	136	204	213	68	76	68	80	71	71	39	29	32	28	29	30
101 to 180.....	319	280	225	311	273	286	149	148	149	147	147	145	19	17	17	17	18	16
181 to 260.....	464	330	314	362	219	262	228	228	228	227	223	226	14	13	13	13	14	13
261 to 340.....	212	164	134	157	101	111	301	303	303	299	299	300	12	12	12	12	12	11
341 to 420.....	149	102	106	90	81	86	381	382	381	380	376	376	11	11	10	10	11	10
421 and over.....	135	81	96	63	51	72	506	505	509	512	511	542	9	9	9	8	9	8

Bureau of Agricultural Economics. From returns to mail inquiry sent to crop reporters in all cotton States.

<sup>1</sup> The average yield of lint cotton in the United States, as estimated by the crop-reporting board, has been as follows: 1925, 167.2 pounds; 1926, 132.6 pounds; 1927, 154.5 pounds; 1928, 152.9 pounds; 1929, 155 pounds; 1930, 147.7 pounds.<sup>2</sup> The average costs per pound for the yield groups which closely approximated the average yields for the United States as estimated by the crop-reporting board are as follows: 1925, 13 cents; 1926, 16.5 cents; 1927, 17 cents; 1928, 16 cents; 1929, 16 cents. At least a part of the yearly variations in costs in some of the upper and lower yield groups may be due to the small number of reports, and to the relative number of reports received each year from various sections of the Cotton Belt.

TABLE 466.—Index numbers of prices paid by farmers, 1910-1930

[Base 1910-1914=100]

Year or date	Commodities used in production							Wage rates paid to hired labor	Commodities bought for use in production plus wages paid to hired labor	Commodities bought for family maintenance <sup>1</sup>	All commodities bought for use in production and family maintenance	Taxes on farm property <sup>2</sup>
	Feed	Machinery	Fertilizer	Building materials for other than houses	Equipment and supplies	Seed <sup>1</sup>	All commodities bought for use in production					
	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.
1910.....	92	101	97	100	101	-----	98	97	98	98	98	-----
1911.....	108	103	97	102	100	-----	103	97	102	100	101	-----
1912.....	90	100	102	102	100	105	98	101	99	101	100	-----
1913.....	103	98	104	101	100	94	102	101	102	99	100	-----
1914.....	103	98	101	98	99	101	99	101	100	102	101	-----
1915.....	98	101	113	102	106	117	103	102	103	107	106	102
1916.....	129	111	122	118	129	112	121	112	119	125	123	104
1917.....	136	132	139	137	156	141	152	140	149	148	150	106
1918.....	196	160	173	161	180	188	176	176	176	180	178	118
1919.....	208	178	185	189	179	264	192	206	196	214	205	130
1920.....	133	188	189	205	188	149	175	239	189	227	206	155
1921.....	91	175	159	156	151	125	142	150	144	165	156	217
1922.....	118	156	131	159	139	133	140	146	142	160	152	232
1923.....	128	151	128	160	138	142	142	166	147	161	153	246
1924.....	135	155	122	159	131	148	143	166	148	162	154	249
1925.....	145	158	131	163	136	170	149	168	154	165	159	250
1926.....	120	156	139	163	142	190	144	171	150	164	156	253
1927.....	124	157	123	164	134	192	144	170	150	161	154	258
1928.....	133	158	133	161	131	179	146	169	151	162	156	263
1929.....	131	162	132	162	129	190	146	170	152	160	155	267
1930.....	119	159	128	158	124	169	140	152	142	151	146	266

Bureau of Agricultural Economics. Compiled from prices reported to the Department of Agriculture by retail dealers throughout the United States. The index numbers include only commodities bought by farmers; the commodities being weighted according to purchases reported by actual farmers in farm management and rural-life studies from 1920 to 1925.

<sup>1</sup> 1912-1914=100.

<sup>2</sup> Includes food, clothing, household operating expenses, furniture and furnishing, and building materials for house.

<sup>3</sup> 1914=100.

TABLE 467.—Index numbers of farm prices, 1910-1930: By groups, crop-year averages

[August, 1909-July, 1914=100]

Year beginning July	Grains		Fruits and vegetables		Meat animals		Dairy products		Poultry products		Cotton and cotton-seed		All groups	
	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.
1910.....	95	96	94	96	95	95	95	95	114	98	97	97	97	97
1911.....	107	120	88	101	83	101	83	84	97	93	97	97	97	97
1912.....	93	87	104	101	97	93	93	93	93	93	93	93	93	93
1913.....	98	105	111	101	106	99	103	103	103	103	103	103	103	103
1914.....	120	85	108	99	104	69	101	101	101	101	101	101	101	101
1915.....	109	98	110	98	104	94	104	104	104	104	104	104	104	104
1916.....	172	186	143	112	138	148	148	148	148	148	148	148	148	148
1917.....	229	162	192	139	169	229	229	229	229	229	229	229	229	229
1918.....	226	170	210	162	194	234	234	234	234	234	234	234	234	234
1919.....	246	232	190	185	217	286	286	286	286	286	286	286	286	286
1920.....	184	163	140	170	191	140	140	140	140	140	140	140	140	140
1921.....	102	175	107	137	150	129	129	129	129	129	129	129	129	129
1922.....	111	129	110	137	150	129	129	129	129	129	129	129	129	129
1923.....	112	131	104	141	142	134	134	134	134	134	134	134	134	134
1924.....	155	134	125	181	158	188	188	188	188	188	188	188	188	188
1925.....	140	200	144	139	157	151	151	151	151	151	151	151	151	151
1926.....	124	133	142	137	148	106	106	106	106	106	106	106	106	106
1927.....	136	160	141	138	146	154	154	154	154	154	154	154	154	154
1928.....	119	119	158	141	154	150	150	150	150	150	150	150	150	150
1929.....	117	169	150	133	152	130	130	130	130	130	130	130	130	130
1930.....	82	125	112	109	105	79	79	79	79	79	79	79	79	79

Bureau of Agricultural Economics.

See footnotes, Table 468.

## FARM BUSINESS AND RELATED STATISTICS

901

TABLE 468.—Index numbers of farm prices, United States, 1922-1931

[August, 1909-July, 1914=100]

Group and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
<b>GRAINS</b>	<i>Index no.</i>	<i>Index no.</i>	<i>Index no.</i>	<i>Index no.</i>	<i>Index no.</i>	<i>Index no.</i>	<i>Index no.</i>	<i>Index no.</i>	<i>Index no.</i>	<i>Index no.</i>	<i>Index no.</i>	<i>Index no.</i>	<i>Index no.</i>
1922.....	91	102	111	114	115	111	105	100	97	101	106	111	105
1923.....	113	114	117	121	123	119	112	109	111	113	110	108	114
1924.....	110	113	114	113	114	116	130	141	140	150	147	155	139
1925.....	172	178	172	152	159	164	152	157	148	135	133	140	156
1926 <sup>1</sup> .....	143	140	133	131	131	130	125	128	121	123	121	120	129
1927 <sup>1</sup> .....	120	122	121	119	127	140	139	138	134	128	120	123	128
1928 <sup>1</sup> .....	126	128	136	144	160	152	142	120	117	116	110	112	130
1929 <sup>1</sup> .....	115	128	124	120	113	111	122	129	131	128	118	119	121
1930 <sup>1</sup> .....	118	115	107	110	105	106	92	101	100	92	80	80	100
1931 <sup>1</sup> .....	77	75	74	74	74	67	57	54	50	46	57	52	63
<b>FRUITS AND VEGETABLES</b>													
1922.....	159	173	181	190	206	197	174	129	109	101	101	104	152
1923.....	117	122	130	146	157	161	165	151	131	123	114	114	136
1924.....	118	123	123	128	132	146	142	138	113	109	108	110	124
1925.....	122	131	133	146	162	164	175	178	142	152	154	154	160
1926 <sup>1</sup> .....	214	218	220	253	240	216	185	186	136	136	142	137	189
1927 <sup>1</sup> .....	140	142	140	147	158	201	185	172	145	138	136	141	155
1928 <sup>1</sup> .....	144	153	174	179	181	168	166	137	127	114	109	108	146
1929 <sup>1</sup> .....	109	111	112	110	119	120	136	160	160	168	159	163	136
1930 <sup>1</sup> .....	167	168	169	187	193	193	173	149	148	127	114	108	158
1931 <sup>1</sup> .....	108	109	109	120	119	114	110	97	83	70	68	68	98
<b>MEAT ANIMALS</b>													
1922.....	95	108	118	117	119	121	120	114	112	113	108	107	113
1923.....	110	110	110	110	108	103	105	104	112	108	100	98	106
1924.....	101	102	104	106	107	105	108	116	115	121	115	113	109
1925.....	123	126	145	146	139	139	148	149	143	141	136	136	139
1926.....	140	146	147	146	148	154	152	144	148	143	142	140	146
1927.....	140	143	144	143	137	129	131	136	142	145	141	138	139
1928.....	138	139	139	142	151	150	157	162	174	160	150	143	150
1929.....	146	150	160	164	164	163	167	165	156	151	144	143	156
1930.....	146	150	151	146	142	141	127	119	128	123	118	112	134
1931.....	113	106	106	106	99	91	92	92	86	79	76	68	93
<b>DAIRY PRODUCTS</b>													
1922.....	140	134	133	131	126	128	127	129	133	136	140	147	134
1923.....	151	151	148	147	142	142	139	142	145	153	157	155	148
1924.....	152	150	146	134	128	126	123	120	126	130	132	137	134
1925.....	134	134	137	132	132	130	131	135	137	146	146	146	137
1926.....	147	143	141	133	130	128	129	128	133	134	141	144	136
1927.....	144	143	139	140	136	132	130	129	135	139	141	145	138
1928.....	145	145	142	139	136	134	134	135	141	143	144	146	140
1929.....	145	144	144	142	139	135	135	137	139	141	142	140	140
1930.....	135	129	126	126	128	118	115	117	128	125	124	117	123
1931.....	107	101	101	99	91	86	85	87	92	95	95	92	94
<b>POULTRY PRODUCTS</b>													
1922.....	176	140	118	110	114	113	111	114	132	159	187	198	139
1923.....	175	151	130	117	117	114	116	126	144	165	191	198	145
1924.....	162	157	109	105	109	115	121	132	153	176	203	217	147
1925.....	213	166	124	127	131	135	141	148	152	175	208	213	161
1926.....	172	145	128	133	135	138	137	137	155	173	202	212	156
1927.....	173	145	115	114	112	102	112	122	143	167	189	195	141
1928.....	177	144	122	121	128	127	134	140	156	168	185	197	150
1929.....	161	158	144	127	134	140	143	151	165	181	200	204	159
1930.....	173	154	115	117	110	103	101	107	126	129	146	127	126
1931.....	110	79	92	90	77	81	83	93	99	110	123	120	96
<b>COTTON AND COTTON-SEED</b>													
1922.....	129	123	131	135	144	160	166	166	160	163	186	195	156
1923.....	203	215	224	222	211	207	199	190	204	221	238	253	216
1924.....	255	247	219	226	222	219	215	219	175	182	179	176	211
1925.....	182	183	195	189	184	183	186	186	178	171	144	139	177
1926.....	133	142	133	135	130	132	126	130	134	94	88	81	122
1927.....	85	94	102	101	113	119	125	136	179	169	162	153	128
1928.....	152	141	147	154	166	162	170	153	142	147	146	148	152
1929.....	143	149	155	152	148	146	145	146	146	141	132	130	145
1930.....	128	121	113	120	119	115	99	94	83	76	80	73	102
1931.....	72	76	80	78	74	65	71	53	47	42	50	45	63

<sup>1</sup> Kafr omitted.<sup>2</sup> Onions and cabbage omitted.

TABLE 468.—*Index numbers of farm prices, United States, 1922-1931—Continued*

[August, 1909-July, 1914=100]

Group and year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
ALL GROUPS	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.
1922.....	114	118	123	123	127	128	126	120	119	122	126	131	124
1923.....	134	136	136	137	135	133	130	128	132	134	136	137	135
1924.....	137	136	131	130	129	130	132	139	132	135	137	139	134
1925.....	140	146	151	147	145	145	140	152	144	143	144	143	147
1926 <sup>1</sup> .....	143	143	140	140	139	139	136	133	134	130	130	127	130
1927 <sup>2</sup> .....	126	127	126	125	126	130	130	132	140	139	137	137	131
1928 <sup>3</sup> .....	137	135	137	140	143	145	145	139	141	137	134	134	139
1929 <sup>3</sup> .....	133	136	140	138	136	135	140	143	141	140	136	135	138
1930.....	134	131	126	127	124	123	111	108	111	106	103	97	117
1931 <sup>3</sup> .....	94	90	91	91	86	80	79	75	72	68	71	66	60

Bureau of Agricultural Economics. Prices of farm production received by producers collected monthly from a list of about 12,000 special price reporters. This list is made up almost entirely of country-town dealers, elevator managers, buyers, and merchants.

The commodities by groups are as follows: Grains—wheat, corn, oats, barley, rye, kafir; fruits and vegetables—apples, oranges, grapefruit, potatoes, sweetpotatoes, beans, onions, cabbage; meat animals—beef cattle, calves, hogs, sheep, lambs; dairy products—butter (represents butter, butterfat, and cream), milk; poultry products—chickens, eggs; cotton and cottonseed; all groups includes also horses (represents horses and mules), hay, flax, tobacco, and wool.

<sup>1</sup> Kafir, onions, and cabbage omitted.

TABLE 469.—*Index numbers of general trend of prices and wages 1910-1931*

[1910-1914=100]

Year and month	Whole-sale prices of all commodities <sup>1</sup>	Industrial wages <sup>2</sup>	Prices paid by farmers for commodities used in—			Farm wage rates	Taxes <sup>3</sup>
			Living	Pro-duction	Living and pro-duction		
	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.	Index no.
1910.....	103	-----	98	98	98	97	-----
1911.....	95	-----	100	103	101	97	-----
1912.....	101	-----	101	98	100	101	-----
1913.....	103	-----	100	102	100	104	-----
1914.....	99	-----	102	99	101	101	100
1915.....	102	101	107	108	106	102	102
1916.....	125	114	125	121	123	112	104
1917.....	172	129	148	152	150	140	106
1918.....	192	160	180	176	178	176	118
1919.....	202	185	214	192	205	206	130
1920.....	225	222	227	175	206	239	165
1921.....	142	203	165	142	156	150	217
1922.....	141	197	160	140	152	146	232
1923.....	147	214	161	142	153	166	246
1924.....	143	218	162	143	154	166	249
1925.....	151	223	165	149	159	168	250
1926.....	146	229	164	144	156	171	253
1927.....	139	231	161	144	154	170	258
1928.....	141	232	162	146	156	169	263
1929.....	139	236	160	146	155	170	267
1930.....	126	226	151	140	146	152	266
1931.....	107	207	-----	-----	-----	116	-----

Bureau of Agricultural Economics.

<sup>1</sup> Bureau of Labor Statistics. Index obtained by dividing the new series, 1926=100, by its pre-war average 1910-1914, 63.5.

<sup>2</sup> Average weekly earnings, New York State factories. June, 1914=100.

<sup>3</sup> Index of estimate of total taxes paid on all farm property. 1914=100.

TABLE 470.—Estimated average property tax per acre on farm real estate, by geographic divisions, and United States, 1924-1930

Geographic division	1924	1925	1926	1927	1928	1929	1930
	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
New England.....	0.95	0.96	1.00	1.03	1.05	1.07	1.10
Middle Atlantic.....	1.17	1.21	1.20	1.22	1.23	1.23	1.24
East North Central.....	1.34	1.34	1.35	1.33	1.37	1.40	1.38
West North Central.....	.69	.68	.69	.70	.71	.72	.73
South Atlantic.....	.46	.48	.51	.52	.52	.54	.52
East South Central.....	.45	.45	.46	.46	.47	.48	.48
West South Central.....	.32	.32	.32	.33	.34	.35	.36
Mountain.....	.22	.23	.23	.23	.23	.24	.24
Pacific.....	.92	.93	.95	.97	1.01	1.01	1.02
United States.....	.64	.64	.65	.66	.67	.68	.68

Bureau of Agricultural Economics. Average tax per acre in 1924 based on the 1925 Census of Agriculture. Trends in the United States as a whole and in each geographic division since 1924 are based on weighted averages of replies to questionnaires sent each year to farmers in all parts of the country.

TABLE 471.—Farm wage rates: Averages and index numbers, 1866-1931

[1910-1914=100]

Year	Average yearly farm wage <sup>1</sup>				Weighted average wage rate per month <sup>2</sup>	Index numbers of farm wages	Year	Average yearly farm wage <sup>1</sup>				Weighted average wage rate per month <sup>2</sup>	Index numbers of farm wages
	Per month—		Per day—					Per month—		Per day—			
	With board	Without board	With board	Without board				With board	Without board	With board	Without board		
1866 <sup>3</sup> .....	<i>Dols.</i>	<i>Dols.</i>	<i>Dols.</i>	<i>Dols.</i>	<i>Dols.</i>		1912.....	<i>Dols.</i>	<i>Dols.</i>	<i>Dols.</i>	<i>Dols.</i>	<i>Dols.</i>	
1869.....	10.09	15.50	0.64	0.90	13.14	55	1913.....	20.46	29.14	1.12	1.44	24.01	101
1874 or 1875.....	9.97	15.50	.63	.87	12.93	54	1914.....	21.27	30.21	1.15	1.48	24.83	104
1877 or 1879 <sup>4</sup> .....	11.16	17.10	.68	.94	14.19	59	1915.....	20.90	29.72	1.11	1.44	24.26	101
1879 or 1880.....	10.86	16.79	.61	.84	13.34	56	1916.....	21.08	29.97	1.12	1.45	24.46	102
1880 or 1881.....	11.70	17.53	.64	.89	14.14	59	1917.....	23.04	32.58	1.24	1.60	26.83	112
1884 or 1885.....	12.32	18.52	.67	.92	14.82	62	1918.....	28.64	40.19	1.56	2.00	33.42	140
1887 or 1888.....	12.88	19.11	.70	.97	15.48	65	1919.....	35.12	49.13	2.05	2.61	42.12	176
1889 or 1890.....	13.08	19.22	.71	.96	15.58	65	1920.....	40.14	56.77	2.44	3.10	49.11	206
1891 or 1892.....	13.29	19.67	.72	.98	15.87	66	1921.....	47.24	65.05	2.84	3.56	57.01	239
1893.....	13.29	19.45	.72	.97	15.79	66	1922.....	30.25	43.58	1.66	2.17	35.77	150
1894.....	13.48	20.02	.73	.98	16.06	67	1923.....	29.31	42.09	1.64	2.14	34.91	146
1895.....	13.85	19.97	.72	.92	15.93	67	1924 <sup>5</sup> .....	33.09	46.74	1.91	2.45	39.64	166
1898.....	12.70	18.57	.65	.84	14.00	61	1925 <sup>5</sup> .....	33.24	47.22	1.88	2.44	39.67	166
1899.....	12.75	18.74	.65	.85	14.69	62	1926 <sup>5</sup> .....	33.88	47.80	1.89	2.46	40.12	168
1902.....	13.29	19.18	.71	.94	15.58	65	1927 <sup>5</sup> .....	34.80	48.86	1.91	2.48	40.88	171
1906.....	13.90	19.97	.75	.99	16.34	68	1928 <sup>5</sup> .....	34.58	48.63	1.90	2.46	40.60	170
1909.....	15.51	22.12	.83	1.09	18.12	76	1929 <sup>5</sup> .....	34.66	48.65	1.88	2.43	40.44	169
1910.....	18.73	26.19	1.03	1.32	21.92	93	1930 <sup>5</sup> .....	34.74	49.08	1.88	2.42	40.52	170
1911.....	20.48	28.09	1.04	1.31	23.00	96	1931 <sup>5</sup> .....	31.14	44.59	1.65	2.16	36.24	152
	19.58	28.04	1.07	1.40	23.08	97		23.60	35.03	1.22	1.65	27.61	116
	19.85	28.33	1.07	1.40	23.25	97							

Bureau of Agricultural Economics.

<sup>1</sup> Yearly averages are from reports by crop reporters, giving average wages for the year in their localities.<sup>2</sup> This column has significance only as an essential step in computing the wage index.<sup>3</sup> Years 1866 to 1878 in gold.<sup>4</sup> 1877 or 1878, 1878 or 1879 (combined).<sup>5</sup> Weighted average of quarterly reports, April (weight 1), July (weight 5), October (weight 5), and January of the following year (weight 1).

TABLE 472.—*Male farm labor, by geographic divisions, quarterly, 1931*

Division	Per month, with board				Per month, without board				Per day, with board <sup>1</sup>				Per day, without board <sup>1</sup>			
	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.
	Dols.	Dols.	Dols.	Dols.	Dols.	Dols.	Dols.	Dols.	Dols.	Dols.	Dols.	Dols.	Dols.	Dols.	Dols.	Dols.
North Atlantic.....	36.59	36.22	36.13	34.50	53.65	56.86	55.47	54.84	2.19	2.11	2.09	2.00	2.99	2.89	2.82	2.70
N. Cent., East.....	29.33	29.95	29.08	27.15	43.51	43.03	41.30	38.89	1.64	1.58	1.52	1.42	2.20	2.15	2.03	1.89
N. Cent., West.....	27.82	32.57	31.02	27.51	41.11	44.87	42.14	38.15	1.60	1.63	1.54	1.35	2.21	2.24	2.09	1.87
South Atlantic.....	19.53	17.50	17.58	16.07	28.93	26.44	26.17	23.88	1.00	.90	.91	.82	1.37	1.23	1.20	1.08
South Central.....	19.34	17.88	17.88	16.40	28.69	26.64	25.99	23.78	.95	.89	.88	.80	1.25	1.16	1.15	1.07
Western.....	42.65	43.07	40.17	36.95	63.73	65.02	61.84	55.83	1.98	1.96	1.81	1.69	2.75	2.73	2.50	2.32
United States.....	26.03	25.99	25.35	23.31	39.04	38.37	37.00	34.22	1.38	1.33	1.29	1.18	1.87	1.80	1.73	1.59

Bureau of Agricultural Economics. As reported by field and crop reporters.

<sup>1</sup> Includes piecework.TABLE 473.—*Farm real estate: Index numbers of estimated value per acre, by geographic divisions, 1912-1931<sup>1</sup>*

[1912-1914=100 per cent]

Geographic division	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931
	In- dex no.	In- dex no.	In- dex no.	In- dex no.	In- dex no.	In- dex no.	In- dex no.	In- dex no.	In- dex no.	In- dex no.	In- dex no.	In- dex no.	In- dex no.	In- dex no.	In- dex no.	In- dex no.	In- dex no.	In- dex no.	In- dex no.	In- dex no.
New Eng.....	99	101	100	99	102	112	117	123	140	135	134	130	128	127	128	127	127	126	127	126
Middle Atl.....	98	100	102	100	104	112	117	121	136	127	118	116	114	114	113	111	110	109	106	101
E. N. Cent.....	97	100	103	104	110	116	127	135	161	151	132	128	121	116	111	104	101	100	96	87
W. N. Cent.....	97	100	103	105	114	122	134	147	194	174	150	142	132	126	121	115	118	112	109	97
South Atl.....	98	100	103	98	105	119	135	161	198	174	148	152	151	148	149	137	134	132	128	116
E. S. Cent.....	97	100	103	99	109	120	140	162	199	163	149	149	142	141	139	133	130	129	128	117
W. S. Cent.....	96	100	104	100	103	116	134	143	177	159	136	132	136	144	144	139	137	136	136	121
Mountain.....	98	102	100	98	98	106	117	130	151	133	122	115	110	105	103	101	101	101	102	100
Pacific.....	94	99	106	107	111	122	129	134	156	155	151	143	147	146	144	143	142	142	142	140
United States	97	100	103	103	108	117	129	140	170	157	139	135	130	127	124	119	117	116	115	106

Bureau of Agricultural Economics. Based on values as reported by crop reporters. Values as reported by the census for 1910, 1920, and 1925 will be found in Table 511 of the 1927 Yearbook.

<sup>1</sup> All farm land with improvements, as of Mar. 1. Owing to rounding of figures, 1912-14 will not always equal exactly 100 per cent.

TABLE 474.—*Number of farms per 1,000 changing ownership by various methods, by geographic divisions, 12 months ended March 15, 1928-1931*

Geographic division	Voluntary sales and trades <sup>1</sup>				Forced sales and related defaults, total				Inheritance and gift			
	1928	1929	1930	1931	1928	1929	1930	1931	1928	1929	1930	1931
	No. per 1,000	No. per 1,000	No. per 1,000	No. per 1,000	No. per 1,000	No. per 1,000	No. per 1,000	No. per 1,000	No. per 1,000	No. per 1,000	No. per 1,000	No. per 1,000
New England.....	34.9	30.4	30.7	30.7	10.7	10.9	11.2	9.7	10.4	9.6	10.3	8.8
Middle Atlantic.....	33.7	28.2	28.2	24.5	11.8	12.0	13.1	13.8	8.6	8.0	8.2	8.5
East North Central.....	24.0	21.0	20.8	18.6	20.7	19.1	22.3	21.0	9.7	8.9	9.4	9.3
West North Central.....	23.9	22.4	22.9	18.9	32.4	25.9	27.5	31.3	8.4	8.5	9.8	9.7
South Atlantic.....	20.0	18.3	18.2	14.5	23.3	23.0	23.2	32.2	10.6	10.4	11.4	12.5
East South Central.....	27.5	23.4	23.9	19.4	20.0	15.2	16.1	25.9	9.2	8.8	9.3	9.9
West South Central.....	27.9	25.5	24.2	16.7	18.5	15.2	16.8	22.4	7.8	7.2	7.6	7.4
Mountain.....	34.8	35.6	33.7	24.8	39.4	29.1	29.4	36.4	5.6	6.0	7.0	6.9
Pacific.....	34.3	28.3	30.1	22.1	19.9	17.5	15.2	25.0	7.1	6.5	7.3	6.6
United States.....	26.3	23.5	23.7	19.0	22.8	19.5	20.8	26.1	8.9	8.5	9.3	9.4

Geographic division	Administrators' and executors' sales <sup>2</sup>				Total, all classes <sup>3</sup>			
	1928	1929	1930	1931	1928	1929	1930	1931
	No. per 1,000	No. per 1,000	No. per 1,000	No. per 1,000	No. per 1,000	No. per 1,000	No. per 1,000	No. per 1,000
New England.....	7.1	6.5	6.1	5.6	64.1	58.2	60.2	50.1
Middle Atlantic.....	8.2	7.2	7.0	7.0	64.1	56.6	58.0	55.5
East North Central.....	8.3	6.7	7.8	7.5	63.9	57.0	61.6	60.9
West North Central.....	6.5	6.1	6.2	5.4	72.7	64.1	68.0	66.3
South Atlantic.....	7.9	7.5	7.9	6.5	62.9	60.3	62.7	63.3
East South Central.....	6.6	5.4	5.8	5.6	64.4	53.7	56.5	62.6
West South Central.....	4.2	3.6	3.3	2.4	59.6	52.5	53.3	51.6
Mountain.....	3.7	4.1	4.7	3.6	85.4	76.2	81.7	72.8
Pacific.....	4.4	3.7	3.6	3.6	67.1	57.5	57.6	53.1
United States.....	6.7	5.4	6.1	5.7	66.0	58.0	61.5	61.9

Bureau of Agricultural Economics. Based on returns from crop reporters.

<sup>1</sup> Including contracts to purchase (but not options).<sup>2</sup> Includes all other sales in settlement of estates.<sup>3</sup> Including miscellaneous and unclassified.

TABLE 475.—*Bankruptcies among farmers, number and percentage of total, by geographic divisions, fiscal years ended June 30, 1910–1930*

Year	New England		Middle Atlantic		East North Central		West North Central		South Atlantic	
	Bankruptcies among farmers	Per cent of total bankruptcies	Bankruptcies among farmers	Per cent of total bankruptcies	Bankruptcies among farmers	Per cent of total bankruptcies	Bankruptcies among farmers	Per cent of total bankruptcies	Bankruptcies among farmers	Per cent of total bankruptcies
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
1910.....	123	6.0	52	1.8	98	3.3	287	15.9	63	4.5
1911.....	85	4.4	48	1.6	89	3.4	167	11.0	78	5.1
1912.....	148	7.4	58	1.7	78	2.7	219	14.2	79	4.7
1913.....	81	4.0	66	1.8	143	5.0	268	13.7	85	4.5
1914.....	88	4.0	63	2.0	91	2.8	289	14.6	100	4.5
1915.....	112	4.8	90	2.4	94	2.8	290	13.8	177	5.5
1916.....	143	5.3	88	2.0	146	3.9	276	12.6	369	8.8
1917.....	152	4.8	120	2.7	142	3.6	325	13.6	497	12.2
1918.....	125	4.3	97	2.4	126	3.6	267	11.4	410	13.8
1919.....	104	4.1	89	2.4	75	2.2	156	8.1	291	15.8
1920.....	72	3.8	67	2.2	83	3.3	213	12.0	169	10.1
1921.....	91	6.2	91	3.3	62	3.6	324	20.6	297	13.7
1922.....	92	4.9	77	2.6	247	9.0	1,003	40.3	678	17.0
1923.....	146	4.9	148	3.1	569	11.5	2,005	45.1	999	17.0
1924.....	196	5.8	171	3.2	684	12.2	2,785	42.5	1,065	16.9
1925.....	169	5.2	190	2.6	760	13.4	2,889	39.2	1,037	17.6
1926.....	145	4.6	224	3.4	844	11.3	2,813	35.4	747	12.7
1927.....	105	3.1	224	3.1	719	9.2	2,404	30.3	535	10.0
1928.....	162	3.5	274	3.5	874	9.3	1,729	24.2	685	9.9
1929.....	145	3.2	270	3.2	930	8.8	1,471	21.2	515	7.9
1930.....	141	2.8	305	3.6	973	8.0	1,257	19.2	491	5.9
1931.....	104	2.3	353	3.6	1,025	8.1	1,010	17.9	455	5.8

Year	East South Central		West South Central		Mountain		Pacific		United States	
	Bankruptcies among farmers	Per cent of total bankruptcies	Bankruptcies among farmers	Per cent of total bankruptcies	Bankruptcies among farmers	Per cent of total bankruptcies	Bankruptcies among farmers	Per cent of total bankruptcies	Bankruptcies among farmers	Per cent of total bankruptcies
	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
1910.....	38	2.8	66	8.3	35	7.1	87	9.0	849	5.7
1911.....	65	5.3	72	8.2	35	7.0	40	4.2	679	4.8
1912.....	91	5.7	62	7.0	55	9.1	47	4.6	837	5.4
1913.....	83	4.1	80	7.4	66	8.9	71	5.4	942	5.4
1914.....	100	4.2	81	6.8	118	15.7	115	6.9	1,045	5.6
1915.....	127	4.4	97	9.3	159	19.2	100	5.9	1,246	5.9
1916.....	184	6.8	178	9.4	179	17.0	115	6.1	1,658	6.9
1917.....	184	6.8	217	12.2	193	17.4	156	7.3	1,906	7.5
1918.....	179	5.3	186	13.1	105	11.4	137	6.7	1,632	7.0
1919.....	126	5.6	164	14.9	102	11.9	100	5.8	1,207	6.3
1920.....	108	6.8	95	10.0	104	16.2	86	5.9	997	6.4
1921.....	100	3.9	124	15.7	177	23.8	97	7.2	1,363	9.0
1922.....	201	4.9	264	19.5	419	38.2	192	11.0	3,236	14.4
1923.....	420	9.1	539	20.4	730	43.3	424	16.3	5,940	17.4
1924.....	453	9.7	788	22.3	1,040	46.3	540	15.7	7,772	18.7
1925.....	517	9.7	650	23.6	1,071	41.8	589	14.6	7,872	17.8
1926.....	579	9.5	764	25.6	1,142	42.7	511	11.9	7,760	16.5
1927.....	615	9.7	567	20.7	609	31.8	468	10.0	6,296	13.1
1928.....	521	6.9	561	19.5	420	24.0	453	8.5	5,679	10.6
1929.....	352	4.5	464	17.3	335	20.9	387	6.1	4,939	8.7
1930.....	336	3.8	375	14.7	280	17.1	326	4.6	4,464	7.4
1931.....	338	3.6	282	10.5	201	13.3	255	4.4	4,023	6.7

Bureau of Agricultural Economics. Compiled from annual reports of the Attorney General.

TABLE 476.—*Population: Total population, number and percentage of total population living in rural areas, and percentage of all gainfully employed persons 10 years or older engaged in agricultural pursuits, census years, 1790-1930*

Census years	Total population	Rural population living—				Percentage of all gainfully employed persons engaged in agriculture <sup>1</sup>
		Outside of incorporated places of 2,500 or more		Outside of incorporated places of 2,500 or more	On farms	
	Number	Number	Per cent	Per cent	Per cent	Per cent
1790.....	3,929,214	3,797,742	96.7	-----	-----	-----
1800.....	5,308,483	5,097,610	96.0	-----	-----	-----
1810.....	7,239,881	6,882,901	95.1	-----	-----	-----
1820.....	9,638,463	9,163,318	95.1	-----	-----	83.1
1830.....	12,866,020	12,001,511	93.3	-----	-----	-----
1840.....	17,069,463	15,615,469	91.5	-----	-----	77.5
1850.....	23,191,876	20,294,290	87.5	-----	-----	-----
1860.....	31,443,321	26,371,065	83.9	-----	-----	-----
1870.....	38,558,371	30,486,496	79.1	-----	-----	47.5
1880.....	60,155,783	38,790,085	77.4	71.4	-----	44.3
1890.....	62,947,714	44,703,475	71.0	64.6	-----	39.2
1900.....	75,994,575	50,976,240	67.1	60.0	-----	35.7
1910.....	91,972,660	58,401,932	61.3	54.2	34.7	33.2
1920.....	105,710,620	59,402,980	56.2	48.6	29.5	26.3
1930.....	122,775,046	62,441,594	50.9	43.8	24.6	21.5

Bureau of Agricultural Economics. Compiled from reports of Bureau of the Census.

<sup>1</sup> Some changes in classification of occupations occurred during this time so that the figures are not strictly comparable. In general, however, the trend is indicated closely.TABLE 477.—*Population: Total, urban, rural-farm, and rural nonfarm by geographic divisions, census years, 1920, 1930*

Geographic divisions	Total		Urban <sup>1</sup>		Rural-farm <sup>2</sup>		Rural-nonfarm <sup>3</sup>	
	1920	1930	1920	1930	1920	1930	1920	1930
	Number	Number	Number	Number	Number	Number	Number	Number
New England.....	7,490,909	8,166,941	5,885,073	6,311,976	535,422	499,083	1,000,414	1,355,282
Middle Atlantic.....	22,261,144	26,260,750	16,672,595	20,394,707	1,861,161	1,673,694	3,727,388	4,192,349
East North Central.....	21,475,548	25,297,185	13,049,272	15,794,908	4,887,204	4,453,114	3,539,067	4,040,163
West North Central.....	12,544,249	13,296,916	4,737,372	5,556,181	5,163,183	5,035,581	2,663,694	2,705,173
South Atlantic.....	13,990,272	15,793,689	4,385,792	5,698,122	6,397,767	5,878,959	3,263,723	4,216,511
East South Central.....	8,893,307	9,887,214	1,994,207	2,778,687	5,174,806	5,084,435	1,724,294	2,024,092
West South Central.....	10,242,224	12,176,830	2,970,829	4,427,459	5,210,570	5,807,939	2,080,825	2,441,452
Mountain.....	3,336,101	3,701,789	1,214,980	1,457,922	1,152,969	1,123,693	968,128	1,120,174
Pacific.....	5,566,871	8,194,433	3,471,483	5,534,881	966,544	1,101,085	1,109,844	1,558,514
United States.....	105,710,620	122,775,046	54,304,603	63,954,823	31,358,640	30,157,513	20,047,377	23,662,710

Bureau of the Census.

<sup>1</sup> Persons living in incorporated places of 2,500 or more.<sup>2</sup> Persons living on farms located outside of incorporated places of 2,500 or more.<sup>3</sup> Persons living outside of incorporated places of 2,500 or more who do not live on farms.

TABLE 478.—Number of farms, land in farms, harvested acreage, and land in harvested crops, census years

State and division	Number of farms			Land in farms			Harvested acreage, <sup>1</sup> 1919	Land in harvested crops	
	1920	1925	1930	Acres	1925	1930		Acres	1929
Maine..... New Hampshire..... Vermont..... Massachusetts..... Rhode Island..... Connecticut.....	48,227	50,032	30,006	5,425,968	5,161,428	4,630,938	1,048,621	1,804,014	
	20,523	21,065	14,006	2,003,806	2,252,044	1,960,061	641,406	1,880,106	
	29,076	27,780	24,998	4,285,811	3,925,083	3,896,097	1,189,020	1,073,093	
	82,001	83,454	26,968	2,494,477	2,867,629	2,006,461	625,068	474,167	
	4,083	3,911	3,322	331,000	309,013	279,861	69,368	65,214	
	28,655	28,240	17,106	1,898,980	1,832,110	1,602,279	511,848	372,147	
New England.....	156,564	169,489	124,925	16,990,642	15,867,927	14,283,197	4,622,282	3,609,840	
	New York..... New Jersey..... Pennsylvania.....	183,166	188,764	159,806	20,632,803	19,209,920	17,970,633	8,768,668	8,958,036
26,702		29,671	26,973	2,282,685	1,924,646	1,768,027	1,068,174	907,794	
202,280		200,443	172,410	17,657,518	16,296,408	15,309,485	8,368,144	7,283,511	
426,147		418,868	357,003	40,572,901	37,490,989	35,047,145	18,279,970	16,481,000	
Middle Atlantic.....	Ohio..... Indiana..... Illinois..... Michigan..... Wisconsin.....	266,695	244,703	219,206	23,515,888	22,210,248	21,514,069	12,448,866	
		205,126	195,789	181,070	21,063,332	19,916,120	19,688,676	12,325,426	
		237,181	226,601	214,497	31,974,775	30,731,947	30,696,839	20,948,321	
		196,447	192,337	169,372	19,032,961	18,036,290	17,118,961	9,632,720	
	186,265	193,156	181,707	22,148,223	21,860,853	21,874,155	9,790,136		
	1,084,744	1,061,572	966,502	117,785,179	112,752,468	110,891,179	66,140,460	69,114,189	
East North Central.....	Minnesota..... Iowa..... Missouri..... North Dakota..... South Dakota..... Nebraska..... Kansas.....	178,478	188,231	186,255	30,221,768	30,069,137	30,013,367	17,929,704	
		213,439	213,490	214,928	33,474,896	33,280,813	34,019,332	21,216,889	21,466,350
		263,004	260,473	255,940	34,774,079	32,641,893	32,743,019	16,988,363	13,776,947
		77,690	76,970	77,975	36,214,761	34,327,410	38,657,894	19,649,375	19,877,232
	74,637	79,837	88,157	34,636,491	32,017,066	36,470,083	16,092,743	16,792,967	
	124,417	127,784	126,458	42,225,475	42,024,775	44,708,665	22,306,288	22,381,863	
1,096,951	1,111,314	1,112,765	256,973,229	245,091,143	265,487,907	130,298,190	130,978,827		
West North Central.....	Delaware..... Maryland..... District of Columbia..... Virginia..... West Virginia..... North Carolina..... South Carolina.....	10,140	10,257	9,707	944,511	899,641	800,815	494,901	
		47,908	49,001	45,208	4,767,969	4,483,368	4,374,388	2,110,741	1,777,513
		104	139	104	3,513	3,071	2,288	1,737	1,737
		186,242	183,728	170,610	18,561,112	17,210,174	16,728,620	6,069,571	3,968,570
	87,289	90,380	82,641	9,669,700	8,979,947	8,802,948	2,181,903	1,676,570	
	298,763	283,432	279,708	20,021,736	18,663,670	18,065,103	6,178,532	5,574,921	
192,693	172,707	157,931	12,428,675	10,638,900	10,363,113	5,572,588	4,311,136		
138,715,660	138,715,660	138,715,660	138,715,660	138,715,660	138,715,660	138,715,660	138,715,660	138,715,660	

Georgia.....	310, 732	249, 095	285, 598	25, 441, 061	21, 945, 496	22, 078, 630	11, 415, 550	8, 337, 577	8, 337, 145
Florida.....	54, 005	59, 217	58, 926	6, 046, 691	5, 864, 519	5, 026, 617	1, 563, 616	1, 369, 080	1, 454, 254
South Atlantic.....	1, 183, 976	1, 108, 061	1, 053, 463	97, 775, 243	88, 569, 403	86, 362, 715	34, 493, 689	27, 211, 743	27, 519, 697
Kentucky.....	370, 626	283, 824	246, 469	21, 612, 772	19, 013, 104	19, 927, 288	6, 773, 958	5, 183, 702	5, 330, 821
Tennessee.....	232, 774	232, 669	245, 667	19, 510, 856	17, 921, 139	18, 093, 241	7, 153, 609	6, 209, 428	6, 106, 300
Alabama.....	236, 069	237, 631	237, 335	19, 516, 856	16, 739, 139	17, 554, 635	7, 836, 064	6, 641, 335	7, 113, 937
Mississippi.....	272, 101	237, 228	312, 663	18, 166, 979	16, 083, 243	17, 332, 195	6, 603, 072	5, 661, 671	6, 697, 112
East South Central.....	1, 051, 600	1, 006, 032	1, 062, 214	78, 897, 463	70, 608, 625	72, 817, 357	28, 363, 603	23, 696, 156	25, 148, 170
Arkansas.....	232, 604	221, 991	242, 334	17, 456, 750	15, 632, 439	16, 052, 962	6, 715, 048	6, 220, 830	6, 081, 834
Louisiana.....	135, 463	132, 430	161, 445	10, 019, 822	8, 837, 802	9, 386, 437	4, 022, 244	3, 454, 763	4, 068, 161
Oklahoma.....	191, 983	197, 213	203, 866	31, 951, 934	30, 368, 965	23, 790, 817	15, 339, 040	14, 648, 683	15, 583, 185
Texas.....	436, 033	465, 646	496, 489	114, 030, 621	109, 674, 410	124, 707, 130	25, 467, 351	27, 074, 869	30, 634, 370
West South Central.....	990, 083	1, 017, 305	1, 103, 134	173, 449, 127	165, 013, 316	183, 906, 346	51, 543, 683	51, 335, 135	56, 837, 540
Montana.....	67, 677	46, 904	47, 495	35, 070, 656	32, 735, 723	44, 690, 152	3, 911, 989	6, 416, 335	7, 840, 979
Idaho.....	42, 106	40, 662	41, 674	8, 376, 873	8, 116, 147	9, 346, 908	2, 784, 908	2, 578, 799	3, 150, 097
Wyoming.....	15, 748	16, 612	16, 011	11, 800, 351	13, 693, 308	23, 626, 234	1, 193, 225	1, 872, 625	2, 007, 761
Colorado.....	65, 684	63, 020	69, 956	24, 462, 014	24, 167, 270	28, 876, 171	6, 327, 378	6, 945, 437	6, 740, 968
New Mexico.....	29, 644	31, 637	31, 404	24, 409, 633	27, 830, 325	30, 822, 094	1, 179, 193	1, 345, 045	1, 473, 411
Arizona.....	9, 975	10, 802	14, 173	6, 802, 138	11, 066, 291	10, 626, 627	468, 972	1, 694, 543	1, 473, 411
Utah.....	25, 662	25, 992	27, 159	5, 080, 410	5, 000, 724	6, 613, 101	1, 066, 729	1, 694, 543	1, 159, 890
Nevada.....	3, 163	3, 883	3, 443	2, 357, 153	4, 060, 836	4, 080, 906	3, 924, 327	3, 362, 532	3, 397, 604
Mountain.....	244, 109	233, 392	241, 314	117, 337, 228	131, 639, 374	157, 480, 133	16, 307, 321	19, 705, 967	23, 270, 028
Washington.....	66, 288	73, 297	70, 904	13, 244, 720	12, 610, 310	13, 533, 778	4, 228, 636	3, 262, 824	3, 653, 514
Oregon.....	60, 208	58, 911	55, 153	13, 542, 318	14, 130, 847	16, 548, 678	2, 968, 483	2, 692, 219	2, 906, 324
California.....	117, 670	136, 469	155, 676	29, 395, 697	27, 516, 955	30, 442, 681	6, 840, 656	5, 722, 500	6, 549, 967
Pacific.....	234, 104	265, 587	291, 733	65, 152, 705	54, 293, 112	60, 525, 087	14, 087, 750	11, 577, 843	13, 114, 805
United States.....	6, 448, 343	6, 371, 640	6, 283, 646	955, 833, 715	924, 310, 302	936, 771, 016	363, 089, 933	344, 549, 267	380, 242, 061

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census.

1 Some land was double cropped.

TABLE 479.—*Number of farms by tenure of operator and percentage of all farms operated by tenants, 1920 and 1930*

Geographic division and State	Owner operators				Managers	
	Full owners		Part owners		1920	1930
	1920	1930	1920	1930		
<b>New England:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Maine.....	44, 224	35, 468	1, 213	1, 280	738	508
New Hampshire.....	17, 886	12, 966	1, 768	1, 789	546	355
Vermont.....	23, 926	20, 662	1, 195	1, 947	568	480
Massachusetts.....	26, 515	21, 410	1, 672	1, 788	1, 627	958
Rhode Island.....	2, 971	2, 523	274	285	205	99
Connecticut.....	18, 369	14, 271	1, 297	1, 815	1, 070	541
<b>Middle Atlantic:</b>						
New York.....	139, 153	124, 206	12, 564	11, 835	4, 376	2, 652
New Jersey.....	20, 752	19, 554	1, 137	1, 207	987	659
Pennsylvania.....	144, 698	134, 423	8, 800	7, 860	4, 490	2, 742
<b>East North Central:</b>						
Ohio.....	157, 116	136, 332	20, 870	23, 517	3, 085	1, 843
Indiana.....	112, 664	97, 563	24, 546	27, 964	2, 329	1, 478
Illinois.....	100, 903	85, 069	31, 671	34, 823	3, 411	2, 123
Michigan.....	139, 874	118, 928	19, 532	22, 719	2, 319	1, 530
Wisconsin.....	149, 390	132, 778	10, 220	14, 209	2, 427	1, 659
<b>West North Central:</b>						
Minnesota.....	112, 880	97, 878	19, 864	28, 692	1, 596	1, 047
Iowa.....	99, 008	85, 272	22, 880	26, 061	2, 487	1, 980
Missouri.....	153, 852	127, 989	31, 178	37, 329	2, 247	1, 546
North Dakota.....	34, 051	28, 807	22, 866	26, 268	855	470
South Dakota.....	27, 283	22, 372	20, 562	23, 237	781	454
Nebraska.....	50, 565	43, 301	19, 107	24, 117	1, 315	1, 020
Kansas.....	65, 640	57, 151	31, 450	37, 611	1, 495	954
<b>South Atlantic:</b>						
Delaware.....	5, 698	5, 816	322	444	144	165
Maryland.....	30, 842	28, 333	1, 963	2, 490	1, 282	989
District of Columbia.....	91	53	9	6	19	21
Virginia.....	121, 454	104, 956	14, 909	16, 148	2, 124	1, 536
West Virginia.....	66, 220	60, 831	5, 881	5, 992	1, 090	721
North Carolina.....	131, 847	115, 765	19, 529	25, 680	928	648
South Carolina.....	60, 089	45, 515	7, 635	8, 955	738	693
Georgia.....	94, 575	70, 596	7, 548	9, 206	1, 655	1, 406
Florida.....	35, 757	35, 485	2, 730	3, 909	1, 329	2, 835
<b>East South Central:</b>						
Kentucky.....	159, 206	135, 215	20, 121	22, 188	969	675
Tennessee.....	129, 532	109, 853	18, 550	21, 673	807	611
Alabama.....	95, 548	75, 144	11, 641	15, 228	741	603
Mississippi.....	33, 768	77, 832	7, 542	8, 665	989	999
<b>West South Central:</b>						
Arkansas.....	98, 037	72, 597	14, 610	16, 412	736	634
Louisiana.....	51, 895	46, 893	5, 859	6, 266	828	735
Oklahoma.....	69, 786	53, 647	23, 431	24, 067	935	823
Texas.....	171, 427	152, 852	29, 783	37, 663	2, 514	3, 314
<b>Mountain:</b>						
Montana.....	38, 431	20, 101	11, 840	15, 252	899	514
Idaho.....	30, 299	24, 194	4, 348	6, 318	758	603
Wyoming.....	10, 081	7, 896	2, 722	4, 299	377	296
Colorado.....	35, 553	26, 929	9, 738	11, 497	880	838
New Mexico.....	21, 533	19, 930	4, 223	4, 810	433	334
Arizona.....	6, 970	9, 727	899	1, 587	305	548
Utah.....	19, 134	19, 046	3, 445	4, 562	296	220
Nevada.....	2, 493	2, 464	206	306	168	227
<b>Pacific:</b>						
Washington.....	44, 832	49, 702	7, 869	7, 886	1, 168	1, 238
Oregon.....	33, 300	36, 674	6, 563	7, 847	916	842
California.....	75, 882	90, 375	11, 698	13, 131	4, 949	7, 768
<b>New England:</b>	133, 841	107, 300	6, 319	6, 804	4, 802	2, 935
<b>Middle Atlantic:</b>	304, 603	278, 193	22, 501	20, 902	9, 853	6, 053
<b>East North Central:</b>	659, 947	570, 660	106, 939	123, 232	13, 551	8, 633
<b>West North Central:</b>	543, 249	457, 770	167, 897	203, 345	10, 776	7, 471
<b>South Atlantic:</b>	546, 563	467, 100	60, 526	72, 830	9, 799	8, 964
<b>East South Central:</b>	468, 054	397, 594	57, 754	67, 754	3, 506	2, 888
<b>West South Central:</b>	391, 145	325, 989	73, 183	84, 408	5, 013	5, 506
<b>Mountain:</b>	165, 094	130, 287	37, 421	48, 611	4, 116	3, 590
<b>Pacific:</b>	154, 014	176, 751	26, 130	28, 864	7, 033	9, 843
<b>United States.....</b>	<b>3, 366, 510</b>	<b>2, 911, 644</b>	<b>558, 580</b>	<b>656, 750</b>	<b>68, 449</b>	<b>55, 899</b>

Table 479.—Numbers of farms by tenure of operator and percentage of all farms operated by tenants, 1920 and 1930—Continued

Geographic division and State	Tenants					
	Southern croppers		Tenants, including croppers		Percentage of all farms	
	1920	1930	1920	1930	1920	1930
<b>New England:</b>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Per cent</i>	<i>Per cent</i>
Maine.....			2,004	1,755	4.2	4.5
New Hampshire.....			1,373	796	6.7	5.3
Vermont.....			3,386	2,409	11.6	9.7
Massachusetts.....			2,287	1,442	7.1	5.6
Rhode Island.....			633	415	15.5	12.5
Connecticut.....			1,919	1,068	8.5	6.2
<b>Middle Atlantic:</b>						
New York.....			37,103	21,113	19.2	13.2
New Jersey.....			8,826	3,948	23.0	15.6
Pennsylvania.....			44,262	27,394	21.9	15.9
<b>East North Central:</b>						
Ohio.....			75,644	57,604	29.5	26.3
Indiana.....			65,587	54,575	32.0	30.1
Illinois.....			101,196	92,482	42.7	43.1
Michigan.....			34,722	26,195	17.7	15.5
Wisconsin.....			27,258	33,121	14.4	18.2
<b>West North Central:</b>						
Minnesota.....			44,138	57,638	24.7	31.1
Iowa.....			89,064	101,615	41.7	47.3
Missouri.....			75,727	89,076	28.8	34.8
North Dakota.....			19,918	27,400	25.6	35.1
South Dakota.....			26,041	37,094	34.9	44.6
Nebraska.....			53,430	61,020	42.9	47.7
Kansas.....			66,701	70,326	40.4	42.3
<b>South Atlantic:</b>						
Delaware.....	208	225	3,986	3,262	39.3	33.8
Maryland.....	1,469	1,646	13,841	11,441	28.9	26.5
District of Columbia.....			85	24	41.7	23.1
Virginia.....	13,715	17,233	47,745	47,070	25.6	28.1
West Virginia.....	1,628	1,864	14,068	15,847	16.2	18.6
North Carolina.....	39,939	69,091	117,459	137,615	43.5	49.2
South Carolina.....	43,789	48,939	124,231	102,768	64.5	65.1
Georgia.....	97,497	100,854	206,954	174,390	68.6	68.2
Florida.....	4,291	4,616	13,689	16,737	25.3	28.4
<b>East South Central:</b>						
Kentucky.....	29,450	30,250	90,330	88,421	33.4	33.9
Tennessee.....	38,078	50,304	103,885	113,520	41.1	46.2
Alabama.....	47,897	65,134	148,209	165,420	57.9	64.7
Mississippi.....	86,859	135,293	179,802	225,617	66.1	72.2
<b>West South Central:</b>						
Arkansas.....	47,665	75,084	119,221	152,691	51.3	63.0
Louisiana.....	31,309	49,428	77,381	107,551	57.1	66.6
Oklahoma.....	8,920	21,065	97,836	125,329	51.0	61.5
Texas.....	68,381	103,122	232,309	301,060	53.3	60.9
<b>Mountain:</b>						
Montana.....			6,507	11,628	11.3	24.5
Idaho.....			6,701	10,559	15.9	25.3
Wyoming.....			1,968	3,530	12.5	22.0
Colorado.....			13,763	20,662	28.0	34.5
New Mexico.....			3,656	6,330	12.2	20.2
Arizona.....			1,501	2,331	18.1	16.4
Utah.....			2,787	3,321	10.9	12.2
Nevada.....			296	445	9.4	12.9
<b>Pacific:</b>						
Washington.....			12,419	12,078	18.7	17.0
Oregon.....			9,427	9,780	18.8	17.8
California.....			25,141	24,402	21.4	18.0
<b>New England:</b>						
Middle Atlantic.....			11,902	7,855	7.4	6.3
East North Central.....			88,190	52,455	20.7	14.7
West North Central.....			304,407	263,977	28.1	27.3
South Atlantic.....			375,019	444,169	34.2	39.9
East South Central.....	202,526	244,658	542,088	509,574	46.8	48.1
West South Central.....	202,284	280,951	522,286	583,978	49.7	55.9
Mountain.....	156,281	250,639	526,747	687,231	52.9	62.3
Pacific.....			37,478	58,326	15.4	24.4
			46,957	46,270	20.1	17.7
<b>United States.....</b>	<b>561,031</b>	<b>770,273</b>	<b>2,464,804</b>	<b>2,684,363</b>	<b>38.1</b>	<b>42.4</b>

TABLE 480.—*Farm mortgage debt: Estimated total for all farms, by States, January 1, 1910-1930*

State and division	1910 <sup>1</sup>	1920	1925	1928	1930 <sup>2</sup>
	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars
Maine.....	13, 210	20, 890	26, 097	25, 252	24, 823
New Hampshire.....	5, 870	8, 600	7, 732	7, 780	9, 901
Vermont.....	15, 850	29, 040	28, 001	28, 322	33, 102
Massachusetts.....	22, 890	34, 180	32, 207	31, 262	42, 550
Rhode Island.....	2, 210	2, 350	2, 435	2, 455	3, 854
Connecticut.....	16, 080	25, 800	27, 276	27, 423	30, 514
<b>New England.....</b>	<b>76, 110</b>	<b>120, 880</b>	<b>128, 748</b>	<b>122, 494</b>	<b>144, 744</b>
New York.....	154, 190	224, 060	226, 776	219, 812	247, 633
New Jersey.....	31, 720	39, 500	41, 741	40, 370	56, 884
Pennsylvania.....	95, 620	133, 080	120, 281	116, 432	174, 037
<b>Middle Atlantic.....</b>	<b>281, 530</b>	<b>396, 640</b>	<b>388, 798</b>	<b>376, 614</b>	<b>478, 554</b>
Ohio.....	113, 320	210, 760	214, 409	222, 101	259, 630
Indiana.....	111, 280	206, 600	204, 453	277, 289	286, 989
Illinois.....	266, 780	502, 890	650, 353	685, 365	681, 266
Michigan.....	108, 970	215, 740	228, 069	235, 899	230, 877
Wisconsin.....	193, 600	455, 470	504, 553	529, 992	602, 549
<b>East North Central.....</b>	<b>794, 950</b>	<b>1, 591, 420</b>	<b>1, 861, 387</b>	<b>1, 850, 128</b>	<b>1, 890, 811</b>
Minnesota.....	146, 160	455, 540	553, 784	558, 456	530, 025
Iowa.....	431, 500	1, 098, 970	1, 424, 352	1, 402, 178	1, 068, 610
Missouri.....	202, 650	385, 790	440, 022	447, 351	428, 227
North Dakota.....	101, 450	267, 780	226, 714	230, 250	204, 568
South Dakota.....	83, 700	278, 880	372, 004	370, 946	295, 725
Nebraska.....	161, 850	416, 860	617, 930	599, 418	560, 973
Kansas.....	163, 770	295, 870	482, 596	447, 686	487, 122
<b>West North Central.....</b>	<b>1, 296, 080</b>	<b>3, 199, 690</b>	<b>4, 126, 402</b>	<b>4, 056, 187</b>	<b>3, 605, 280</b>
Delaware.....	6, 500	8, 990	8, 695	9, 469	11, 841
Maryland.....	29, 580	49, 230	50, 422	54, 980	64, 825
District of Columbia.....	280	340	304	354	642
Virginia.....	24, 000	61, 600	79, 709	87, 117	88, 865
West Virginia.....	8, 210	15, 960	18, 570	20, 155	24, 283
North Carolina.....	18, 960	56, 580	78, 606	90, 866	104, 979
South Carolina.....	20, 530	51, 220	68, 735	77, 214	67, 507
Georgia.....	28, 800	83, 840	109, 080	123, 305	100, 945
Florida.....	4, 380	19, 710	25, 508	28, 436	46, 140
<b>South Atlantic.....</b>	<b>141, 250</b>	<b>347, 470</b>	<b>439, 609</b>	<b>491, 896</b>	<b>503, 927</b>
Kentucky.....	40, 510	104, 100	94, 549	103, 798	97, 668
Tennessee.....	26, 850	83, 130	85, 857	96, 711	87, 313
Alabama.....	24, 890	55, 450	66, 410	69, 488	83, 784
Mississippi.....	31, 320	77, 420	109, 562	111, 500	96, 894
<b>East South Central.....</b>	<b>123, 560</b>	<b>320, 100</b>	<b>366, 378</b>	<b>381, 497</b>	<b>365, 609</b>
Arkansas.....	22, 200	76, 870	97, 809	103, 464	85, 577
Louisiana.....	19, 090	41, 250	57, 910	61, 760	61, 379
Oklahoma.....	77, 680	188, 890	218, 963	228, 613	214, 093
Texas.....	172, 240	396, 670	485, 587	507, 515	543, 951
<b>West South Central.....</b>	<b>291, 210</b>	<b>708, 680</b>	<b>860, 269</b>	<b>901, 252</b>	<b>904, 940</b>
Montana.....	19, 620	154, 940	116, 616	104, 862	129, 200
Idaho.....	24, 270	115, 350	107, 355	100, 083	106, 908
Wyoming.....	7, 820	32, 970	43, 364	40, 922	42, 948
Colorado.....	41, 800	138, 400	153, 727	144, 464	146, 462
New Mexico.....	4, 810	23, 670	28, 784	26, 900	30, 729
Arizona.....	4, 680	31, 790	29, 545	29, 008	28, 743
Utah.....	7, 170	35, 550	39, 152	36, 367	46, 373
Nevada.....	3, 340	11, 880	15, 244	13, 997	14, 737
<b>Mountain.....</b>	<b>113, 710</b>	<b>544, 550</b>	<b>533, 787</b>	<b>496, 551</b>	<b>546, 000</b>
Washington.....	45, 040	116, 740	121, 371	120, 523	131, 299
Oregon.....	34, 950	91, 090	105, 503	110, 875	116, 805
California.....	122, 080	426, 460	442, 988	460, 511	548, 421
<b>Pacific.....</b>	<b>202, 070</b>	<b>633, 290</b>	<b>669, 742</b>	<b>691, 909</b>	<b>796, 525</b>
<b>United States.....</b>	<b>3, 320, 470</b>	<b>7, 857, 700</b>	<b>9, 360, 620</b>	<b>9, 468, 526</b>	<b>9, 241, 390</b>

Bureau of Agricultural Economics.

<sup>1</sup> Revised.<sup>2</sup> Preliminary.

TABLE 481.—*Agricultural loans from selected Federal and other agencies, outstanding at close of year, 1917-1931*

End of year	Farm mortgage loans <sup>1</sup> by—				Federal credit to—	intermediate bank loans
	Federal land banks <sup>2</sup>	Joint-stock land banks <sup>3</sup>	Loans of 40 life insurance companies <sup>4</sup>	Member banks <sup>5</sup>	Coopera- tive associa- tions <sup>6</sup>	Financing agencies <sup>7</sup>
	Million dollars	Million dollars	Million dollars	Million dollars	Thousand dollars	Thousand dollars
1917.....	\$ 30					
1918.....	156	8				
1919.....	294	60				
1920.....	350	78				
1921.....	433	85				
1922.....	639	219				
1923.....	800	393	1,335		33,627	9,105
1924.....	928	446	1,452		43,507	13,780
1925.....	1,006	546	1,523		55,780	26,272
1926.....	1,078	632	1,588	\$ 499	52,704	39,730
1927.....	1,156	667	1,613	\$ 478	31,991	43,324
1928.....	1,194	605	1,606	\$ 444	36,174	45,103
1929.....	1,197	585	1,591	388	26,073	50,018
1930.....	1,187	553	1,554	387	64,377	65,633
1931.....	1,163	530			45,255	74,613

Bureau of Agricultural Economics.

<sup>1</sup> See table for total mortgage debt, by States.<sup>2</sup> Federal Farm Loan Board. Beginning 1928 loans from joint-stock land banks in receivership not included.<sup>3</sup> Association of Life Insurance Presidents. Reports cover operations of 40 companies representing 82 per cent of the admitted assets of all legal reserve life companies in the United States<sup>4</sup> Federal Reserve Board.<sup>5</sup> Nov. 30.<sup>6</sup> June 30.TABLE 482.—*Selected interest and discount rates, and bond yields, 1917-1931*

Year	12 Federal land banks' rates to borrow- ers <sup>1</sup>	12 Federal inter- mediate credit banks' loan and discount rates <sup>1</sup>		Yield on Federal land bank bonds	Rates on commen- cial paper (4-6 months) (aver- age) <sup>2</sup>	Federal reserve bank dis- count rates (New York) <sup>2</sup>
		Loans	Discounts			
	<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Average</i>	<i>Range</i>
1917.....	5.05			4.33	4.74	4-4½
1918.....	5.45			4.39	5.86	4½-4¾
1919.....	5.50			4.22	5.43	4½
1920.....	5.50			5.14	7.46	4¾-7
1921.....	5.88			5.11	6.56	4½-7
1922.....	5.71			4.50	4.48	4-4½
1923.....	5.50	5.50	5.50	4.39	5.01	4-4½
1924.....	5.50	5.12	5.33	4.55	3.87	3-4½
1925.....	5.46	4.59	5.04	4.34	4.03	3-3½
1926.....	5.30	4.70	4.90	4.27	4.34	3½-4
1927.....	5.11	4.51	4.73	4.08	4.10	3½-4
1928.....	5.05	4.81	4.91	4.26	4.85	3½-5
1929.....	5.32	5.56	5.61	4.78	5.84	4½-6
1930.....	5.63	4.53	4.54	4.70	3.58	2½-4½
1931.....	5.63	4.08	4.08	5.34	2.63	1½-3½

Bureau of Agricultural Economics.

<sup>1</sup> Federal Farm Loan Board.<sup>2</sup> Federal Reserve Board.



## 915

Charlotte, N. C.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Wilmington, N. C.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Charleston, S. C.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Greenville, S. C.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Atlanta, Ga.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Thomasville, Ga.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Waycross, Ga.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Memphis, Tenn.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Niagara Falls, N. Y.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Birmingham, Ala.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Mobile, Ala.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Meridian, Miss.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Vicksburg, Miss.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
New Orleans, La.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Shreveport, La.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
San Antonio, Tex.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
El Paso, Tex.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Fort Worth, Tex.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Galveston, Tex.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
San Antonio, Tex.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Oklahoma City, Okla.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Lawton, Okla.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Midvale City, Mont.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Harlem, Mont.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Billings, Mont.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Chapman, Mont.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.6	80.8	82.0	83.2	84.4	85.6	86.8	88.0	89.2	90.4	91.6	92.8	94.0	95.2	96.4	97.6	98.8	100.0
Chapman, Mont.	41.2	42.4	43.6	44.8	46.0	47.2	48.4	49.6	50.8	52.0	53.2	54.4	55.6	56.8	58.0	59.2	60.4	61.6	62.8	64.0	65.2	66.4	67.6	68.8	70.0	71.2	72.4	73.6	74.8	76.0	77.2	78.4	79.																	

**Weather Bureau.**

**Normals are based on records of 30 or more years of observations.**



Charlotte, N. C.	3.86	11.24	46.06	49.26	42	2.67	1.26	2.95	1.15	2.99	8.18	8.63	5.07	6.92	5.10	6.97	4.22	6.53	2.63	2.69	3.31	4.41	4.17	1.93	4.13	2.37	4.00
Wilmington, N. C.	2.78	2.64	46.22	38.69	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Charleston, S. C.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Greenville, S. C.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Atlanta, Ga.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Thomasville, Ga.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Jacksonville, Fla.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Miami, Fla.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Nashville, Tenn.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Birmingham, Ala.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Mobile, Ala.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Meridian, Miss.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Yakusburg, Miss.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
New Orleans, La.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
San Antonio, Tex.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
El Paso, Tex.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Fort Worth, Tex.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Galveston, Tex.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
San Antonio, Tex.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Oklahoma City, Okla.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Little Rock, Ark.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Hayes, Mont.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Miles City, Mont.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Kalspell, Mont.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Cheyenne, Wyo.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Shelburne, Wyo.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Grand Junction, Colo.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Santa Fe, N. Mex.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Reswell, N. Mex.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Phoenix, Ariz.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Modena, Utah.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Salt Lake City, Utah.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Winnemucca, Nev.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Bozeman, Idaho.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Seattle, Wash.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Walla Walla, Wash.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Portland, Oreg.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Roseburg, Oreg.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Eureka, Calif.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Bakersfield, Calif.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Fresno, Calif.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Los Angeles, Calif.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
Sacramento, Calif.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
San Diego, Calif.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29
San Francisco, Calif.	2.72	2.25	45.22	38.80	.15	2.72	.60	3.27	2.03	4.51	5.93	6.33	6.39	7.19	1.92	7.13	4.10	4.69	3.62	3.68	3.63	3.68	3.72	3.67	3.80	3.02	3.29

Weather Bureau.

T. = Trace, indicates an amount too small to measure.

1 Normal is based on records of 20 or more years of observations.

TABLE 485.—Frost: Dates of killing frosts, with length of growing season

Station	Date of last killing frost in spring, 1931	Date of first killing frost in fall, 1931	Averages and extremes for 80 to 51 years				Length of growing season between average dates of killing frosts
			Spring frosts		Fall frosts		
			Latest date of killing frost	Average date of last killing frost	Earliest date of killing frost	Average date of first killing frost	
							Days
Greenville, Me.	May 18 <sup>1</sup>	Oct. 7	June 23	May 30	Aug. 26	Sept. 14	107
Portland, Me.	May 1	Oct. 19	June 20	May 14	Sept. 11	Oct. 18	157
Concord, N. H.	May 18 <sup>1</sup>	Oct. 11	June 5	May 7	Sept. 6	Sept. 30	146
Northfield, Vt.	May 14	Oct. 19	June 20	May 22	Aug. 27	Sept. 19	120
Boston, Mass.	Mar. 15 <sup>1</sup>	Nov. 7	May 16	Apr. 14	Sept. 26	Oct. 24	193
Hartford, Conn.	Apr. 12 <sup>1</sup>	do.	May 22	Apr. 23	Sept. 16	Oct. 13	173
Albany, N. Y.	do.	do.	May 30	do.	Sept. 15	Oct. 16	176
Buffalo, N. Y.	Apr. 30	Nov. 6	May 21	Apr. 28	Oct. 3	Oct. 21	176
Canton, N. Y.	May 1	Oct. 9	June 2	May 8	Sept. 11	Sept. 28	143
Setauket, N. Y.	Mar. 23 <sup>1</sup>	do.	May 17	Apr. 16	Oct. 21	Nov. 10	208
Syracuse, N. Y.	Apr. 12 <sup>1</sup>	Nov. 7	May 5	Apr. 24	Sept. 21	Oct. 22	181
Atlantic City, N. J.	Mar. 18 <sup>1</sup>	do.	Apr. 30	Apr. 11	Oct. 1	Nov. 5	208
Trenton, N. J.	Mar. 22 <sup>1</sup>	do.	May 17	Apr. 20	Sept. 22	Oct. 19	182
Erie, Pa.	Apr. 12	Nov. 27	do.	do.	Oct. 9	Nov. 2	196
Harrisburg, Pa.	Mar. 17 <sup>1</sup>	Nov. 7	May 12	Apr. 10	Oct. 8	Oct. 27	200
Pittsburgh, Pa.	May 4 <sup>1</sup>	Oct. 19	May 29	Apr. 21	Sept. 19	Oct. 22	184
Scranton, Pa.	May 1	Oct. 13	May 10	Apr. 20	Sept. 14	Oct. 13	176
Cincinnati, Ohio	Apr. 7	Nov. 5	Apr. 26	Apr. 14	Sept. 30	Oct. 25	194
Cleveland, Ohio	Apr. 27	Nov. 7	May 21	Apr. 15	Oct. 2	Nov. 2	201
Columbus, Ohio	Apr. 7 <sup>1</sup>	Nov. 6	May 17	Apr. 17	Sept. 21	Oct. 18	184
Dayton, Ohio	Apr. 7	do.	May 25	Apr. 19	Sept. 30	Oct. 20	184
Toledo, Ohio	Apr. 30	do.	May 29	Apr. 22	Sept. 9	Oct. 18	179
Evansville, Ind.	Mar. 12	Nov. 25	Apr. 26	Apr. 6	Sept. 30	Oct. 27	204
Fort Wayne, Ind.	Apr. 28	Oct. 18	May 28	Apr. 18	Sept. 14	Oct. 17	182
Indianapolis, Ind.	Apr. 2 <sup>1</sup>	Nov. 6	May 25	Apr. 16	Sept. 21	Oct. 19	186
Chicago, Ill.	Mar. 20	do.	Apr. 30	Mar. 31	Sept. 30	Oct. 29	212
Peoria, Ill.	Apr. 2 <sup>1</sup>	Nov. 24	May 25	Apr. 18	Sept. 20	Oct. 18	183
Springfield, Ill.	Apr. 6	Nov. 6	May 11	Apr. 15	Sept. 26	Oct. 19	187
Alpena, Mich.	do.	do.	May 25	do.	Sept. 25	do.	137
Detroit, Mich.	May 22	Oct. 9	June 9	May 13	Sept. 6	Sept. 30	140
Grand Haven, Mich.	Apr. 27	Nov. 6	May 31	Apr. 30	Sept. 21	Oct. 14	167
Grand Rapids, Mich.	May 4	Oct. 18	May 28	May 1	Sept. 23	Oct. 17	169
Ludington, Mich.	May 3	Nov. 6	May 30	Apr. 28	do.	do.	172
Marquette, Mich.	do.	Nov. 24	June 17	May 2	Sept. 4	Oct. 21	172
Marquette, Wis.	May 23 <sup>1</sup>	Nov. 6	June 6	May 13	Aug. 23	Oct. 9	149
Green Bay, Wis.	May 3	Oct. 18	May 30	May 6	Sept. 16	do.	187
La Crosse, Wis.	May 23	Oct. 17	May 24	Apr. 28	Sept. 10	Oct. 10	166
Madison, Wis.	Apr. 30	Nov. 6	May 25	Apr. 28	Sept. 16	Oct. 17	175
Milwaukee, Wis.	Apr. 23	do.	May 29	Apr. 28	Sept. 25	Oct. 16	171
Duluth, Minn.	May 7 <sup>1</sup>	Nov. 2	June 14	May 7	Sept. 10	Oct. 4	150
Minneapolis, Minn.	May 6 <sup>1</sup>	Nov. 6	May 20	Apr. 26	Sept. 13	Oct. 10	180
Moorhead, Minn.	May 22	Sept. 24	June 8	May 13	Aug. 25	Sept. 24	134
Charles City, Iowa	Apr. 27	Nov. 2	May 21	Apr. 30	Sept. 12	Oct. 7	160
Des Moines, Iowa	May 7	Nov. 4	May 31	Apr. 21	Sept. 13	Oct. 10	172
Dubuque, Iowa	Apr. 24	Nov. 6	May 21	Apr. 20	Sept. 21	Oct. 15	178
Keokuk, Iowa	May 7	do.	May 5	Apr. 14	Sept. 18	Oct. 13	182
Columbia, Mo.	Apr. 5	do.	May 9	Apr. 12	do.	Oct. 18	189
St. Joseph, Mo.	Apr. 27	Nov. 1	Apr. 28	Apr. 11	Sept. 26	do.	186
St. Louis, Mo.	Apr. 28 <sup>1</sup>	Nov. 25	May 22	Apr. 4	Sept. 30	Oct. 28	207
Springfield, Mo.	Apr. 5 <sup>1</sup>	do.	May 19	Apr. 14	do.	Oct. 21	190
Bismarck, N. Dak.	May 20	Oct. 8	June 7	May 11	Aug. 23	Sept. 20	132
Devils Lake, N. Dak.	May 22	Oct. 11	do.	May 16	Aug. 8	Sept. 19	126
Williston, N. Dak.	May 21	Oct. 8	June 16	May 15	Aug. 22	Sept. 20	128
Huron, S. Dak.	May 22	Oct. 31 <sup>1</sup>	June 21	May 10	Aug. 23	Sept. 23	136
Pierre, S. Dak.	May 21	Oct. 31	May 19	Apr. 30	Sept. 12	Oct. 5	168
Rapid City, S. Dak.	do.	Oct. 30	May 24	May 4	Sept. 13	Sept. 29	148
Yankton, S. Dak.	May 22	Nov. 1	May 27	May 1	Sept. 14	Oct. 6	168
North Platte, Nebr.	May 21	Oct. 30	May 24	do.	Sept. 10	Sept. 30	162
Omaha, Nebr.	Apr. 28	Nov. 1	May 19	Apr. 15	Sept. 18	Oct. 13	181
Valentine, Nebr.	May 21	Oct. 15	June 21	May 6	Sept. 12	Oct. 4	161
Concordia, Kans.	Apr. 21 <sup>1</sup>	Nov. 1	May 19	Apr. 17	Sept. 20	Oct. 17	182
Dodge City, Kans.	Apr. 6	Oct. 31	May 27	Apr. 21	Sept. 23	Oct. 21	183
Iola, Kans.	Apr. 22	Nov. 1	May 4	Apr. 7	Sept. 26	Oct. 23	199
Wichita, Kans.	Apr. 6	Oct. 31	May 15	Apr. 10	Sept. 23	Oct. 25	198
Washington, D. C.	Mar. 21	Nov. 7	May 12	Apr. 8	Oct. 2	Oct. 20	195
Lynchburg, Va.	Mar. 21 <sup>1</sup>	Nov. 3	May 7	Apr. 9	do.	Oct. 27	201
Norfolk, Va.	Mar. 13	Dec. 3	Apr. 26	Mar. 25	Oct. 11	Nov. 17	237
Richmond, Va.	Mar. 21 <sup>1</sup>	Nov. 3	do.	Mar. 31	Oct. 12	Oct. 31	214
Wytheville, Va.	Apr. 7 <sup>1</sup>	Oct. 18	May 15	Apr. 15	Sept. 19	Oct. 13	181
Elkins, W. Va.	May 4 <sup>1</sup>	do.	June 1	May 8	Sept. 20	Oct. 8	138
Parkersburg, W. Va.	Apr. 8	Oct. 19	May 22	Apr. 16	Oct. 1	Oct. 16	183
Ashville, N. C.	Mar. 18	do.	May 10	Apr. 15	Oct. 3	Oct. 20	188
Charlotte, N. C.	Mar. 17	Dec. 8	Apr. 26	Mar. 28	Oct. 8	Nov. 5	222
Raleigh, N. C.	do.	Dec. 3	do.	Mar. 29	do.	do.	221
Wilmington, N. C.	Mar. 19	Dec. 16	May 1	Mar. 23	Oct. 16	Nov. 13	235
Charleston, S. C.	Jan. 16 <sup>1</sup>	Nov.	Apr. 2	Feb. 20	Nov. 8	Dec. 10	222

<sup>1</sup> Temperature 32° F. or below.

TABLE 485.—*Frost: Dates of killing frosts, with length of growing season*—Continued

Station	Date of last killing frost in spring, 1931	Date of first killing frost in fall, 1931	Averages and extremes for 30 to 51 years				Length of growing season between average dates of killing frosts
			Spring frosts		Fall frosts		
			Latest date of killing frost	Average date of last killing frost	Earliest date of killing frost	Average date of first killing frost	
Days							
Columbia, S. C.	Mar. 5	Dec. 27	Apr. 17	Mar. 18	Oct. 30	Nov. 18	245
Greenville, S. C.	Mar. 12	Dec. 8	Apr. 24	Apr. 3	Oct. 10	Nov. 2	213
Atlanta, Ga.	Mar. 17	do. <sup>1</sup>	Apr. 17	Mar. 31	Oct. 11	Nov. 7	221
Augusta, Ga.	Feb. 15	Nov. 8	do.	Mar. 22	Oct. 21	Nov. 10	233
Macon, Ga.	Mar. 18	do.	Apr. 18	Mar. 14	Oct. 11	Nov. 14	245
Savannah, Ga.	Feb. 11	None	Apr. 13	Feb. 26	Oct. 25	Nov. 24	271
Thomasville, Ga.	Mar. 8	do.	Apr. 26	Mar. 14	Oct. 21	Nov. 20	251
Apalachicola, Fla.	Jan. 15 <sup>1</sup>	do.	Mar. 23	Feb. 14	Nov. 13	Dec. 7	286
Avon Park, Fla.	None	do.	Mar. 4	Jan. 12	Nov. 14	Dec. 26	348
Jacksonville, Fla.	Jan. 15	do.	Apr. 10	Feb. 16	Nov. 12	Dec. 6	293
Miami, Fla.	None	do.	Mar. 3	(?)	Nov. 21	(?)	(?)
Tampa, Fla.	Jan. 15	do.	Apr. 7	Jan. 26	do.	Jan. 31	342
Chattanooga, Tenn.	Mar. 10 <sup>1</sup>	do.	May 14	Apr. 2	Sept. 30	Oct. 26	207
Knoxville, Tenn.	Mar. 18	Nov. 3	Apr. 25	do.	Oct. 1	Oct. 28	209
Memphis, Tenn.	Feb. 15	Dec. 2	Apr. 25	Mar. 22	Oct. 2	Nov. 3	226
Nashville, Tenn.	Mar. 18	Nov. 7	Apr. 24	Apr. 2	Oct. 8	Oct. 27	208
Birmingham, Ala.	Mar. 17	None	Apr. 20	Mar. 16	Oct. 21	Nov. 9	238
Mobile, Ala.	Jan. 15	do.	Apr. 6	Feb. 17	Oct. 31	Dec. 5	291
Montgomery, Ala.	Feb. 15 <sup>1</sup>	do.	Apr. 5	Mar. 10	Oct. 21	Nov. 11	246
New Orleans, La.	Jan. 15 <sup>1</sup>	do.	Mar. 27	Jan. 25	Nov. 11	Dec. 16	325
Shreveport, La.	Mar. 29	do.	Apr. 9	Mar. 6	Oct. 20	Nov. 10	249
Arlington, Tex.	Apr. 5	Nov. 27	Apr. 23	Mar. 21	Oct. 19	do.	234
Amarillo, Tex.	Apr. 7 <sup>1</sup>	Nov. 22	May 23	Apr. 17	Sept. 22	Oct. 29	195
Brownsville, Tex.	None	None	Mar. 8	Jan. 28	Nov. 15	Dec. 23	328
Corpus Christi, Tex.	do.	do.	Mar. 19	Jan. 21	Nov. 29	Dec. 28	341
Del Rio, Tex.	Mar. 9	Dec. 17	Mar. 27	Feb. 28	Oct. 27	Nov. 17	282
El Paso, Tex.	Mar. 28	Nov. 15	Apr. 26	Mar. 14	do.	Nov. 15	246
Fort Worth, Tex.	do.	Dec. 15	Apr. 9	Mar. 11	Oct. 22	Nov. 12	246
Galveston, Tex.	None	None	Mar. 19	Jan. 19	Nov. 16	Dec. 26	341
Palestine, Tex.	Mar. 28 <sup>1</sup>	Dec. 18	Apr. 5	Mar. 13	Oct. 20	Nov. 13	245
San Antonio, Tex.	Mar. 7 <sup>1</sup>	None	do.	Feb. 24	Oct. 30	Nov. 28	277
Taylor, Tex.	do.	Dec. 18	do.	Mar. 13	do.	Nov. 22	294
Oklahoma City, Okla.	Mar. 31 <sup>1</sup>	Nov. 25	Apr. 30	Mar. 31	Oct. 7	Nov. 2	216
Fort Smith, Ark.	Mar. 29	Dec. 2	Apr. 17	Mar. 21	Oct. 9	Nov. 6	230
Little Rock, Ark.	Mar. 10	do.	Apr. 26	Mar. 18	Oct. 22	Nov. 14	241
Havre, Mont.	May 20 <sup>1</sup>	Sept. 23	June 6	May 16	Aug. 25	Sept. 19	126
Helena, Mont.	May 19	do.	June 9	May 9	do.	Sept. 28	142
Kalispell, Mont.	May 21 <sup>1</sup>	do. <sup>1</sup>	June 7	May 5	Sept. 6	Oct. 2	180
Miles City, Mont.	May 20	do.	May 31	do.	Sept. 7	do.	180
Cheyenne, Wyo.	May 22	Oct. 10 <sup>1</sup>	June 13	May 20	Aug. 25	Sept. 19	122
Lander, Wyo.	do.	Sept. 25	June 18	May 19	Aug. 23	Sept. 18	122
Sheridan, Wyo.	May 20	Oct. 12	June 6	May 20	Aug. 25	Sept. 20	123
Yellowstone Park, Wyo.	May 21 <sup>1</sup>	Sept. 23	June 22	May 21	do.	Sept. 16	118
Denver, Colo.	do.	Oct. 30	June 6	May 4	Sept. 12	Oct. 8	187
Grand Junction, Colo.	Apr. 4	Oct. 27	May 14	Apr. 16	Sept. 14	Oct. 19	186
Pueblo, Colo.	May 22 <sup>1</sup>	Oct. 30	June 2	Apr. 27	Sept. 12	Oct. 8	164
Roswell, N. Mex.	Apr. 5 <sup>1</sup>	do.	May 7	Apr. 12	Oct. 10	Oct. 27	198
Santa Fe, N. Mex.	May 11 <sup>1</sup>	do.	May 23	Apr. 25	Sept. 25	Oct. 18	178
Flagstaff, Ariz.	May 27 <sup>1</sup>	Sept. 21	June 17	May 31	Sept. 12	Sept. 24	116
Phoenix, Ariz.	Jan. 20 <sup>1</sup>	Nov. 23	Mar. 31	Feb. 16	Nov. 5	Dec. 3	280
Tucson, Ariz.	Mar. 8 <sup>1</sup>	do.	Apr. 6	Mar. 11	Oct. 22	Nov. 9	243
Yuma, Ariz.	None	Nov. 23	Feb. 18	Jan. 2	Nov. 30	Dec. 25	357
Modena, Utah	May 21 <sup>1</sup>	Sept. 24 <sup>1</sup>	July 3	May 23	Sept. 5	Sept. 29	129
Salt Lake City, Utah	Apr. 4 <sup>1</sup>	Oct. 27	June 18	Apr. 20	Sept. 22	Oct. 20	183
Reno, Nev.	Apr. 25 <sup>1</sup>	Sept. 23 <sup>1</sup>	June 13	May 13	Sept. 6	Oct. 3	143
Winnemucca, Nev.	May 19 <sup>1</sup>	Sept. 24	June 22	May 16	Aug. 22	Sept. 26	133
Boise, Idaho	Apr. 20	Nov. 9	June 16	Apr. 27	Sept. 11	Oct. 12	168
Lewiston, Idaho	do.	Nov. 12	May 10	Apr. 5	Sept. 21	Oct. 25	203
Pocatello, Idaho	May 8	Oct. 30	June 1	May 1	Sept. 8	Oct. 6	249
Seattle, Wash.	Mar. 5	Nov. 21	May 10	Mar. 17	Oct. 18	Nov. 21	182
Spokane, Wash.	Apr. 3	Oct. 8	June 8	Apr. 14	Sept. 7	Oct. 13	182
Walla Walla, Wash.	Mar. 28	Nov. 12	May 9	Mar. 30	Sept. 24	Nov. 6	220
Baker, Oreg.	May 21	Sept. 23 <sup>1</sup>	June 23	May 8	Aug. 30	Sept. 30	145
Portland, Oreg.	Feb. 22 <sup>1</sup>	Nov. 21	May 2	Mar. 15	Oct. 13	Nov. 19	249
Roseburg, Oreg.	Mar. 26	do.	May 24	Apr. 14	Sept. 24	Nov. 12	212
Eureka, Calif.	None	Nov. 22	Apr. 7	Feb. 8	Nov. 11	Nov. 28	283
Fresno, Calif.	Jan. 19 <sup>1</sup>	do.	Apr. 14	Feb. 22	Oct. 31	Dec. 2	285
Independence, Calif.	Mar. 27	do.	May 24	Apr. 6	Sept. 24	Oct. 28	206
Los Angeles, Calif.	None	None	Feb. 17	(?)	Nov. 2	(?)	(?)
Red Bluff, Calif.	Jan. 19 <sup>1</sup>	Dec. 12	Mar. 10	Nov. 10	Nov. 8	Dec. 6	271
Sacramento, Calif.	Jan. 12 <sup>1</sup>	Nov. 23	May 7	Feb. 19	Nov. 11	Nov. 29	283
San Bernardino, Calif.	Mar. 9 <sup>1</sup>	do.	Apr. 15	Mar. 8	Oct. 23	Nov. 22	259
San Diego, Calif.	None	None	Jan. 20	(?)	Dec. 26	(?)	(?)
San Francisco, Calif.	do.	Dec. 15	Mar. 27	Jan. 25	Dec. 4	Dec. 10	319

Weather Bureau.

<sup>1</sup> Temperature 32° F. or below.<sup>2</sup> Frosts do not occur every year.<sup>3</sup> Of year following

TABLE 486.—Annual rainfall by States, 1881-1930

YEARS 1881-1890

State	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890
Alabama	57.09	60.95	49.74	52.58	53.07	55.33	47.55	57.42	43.30	49.99
Arizona	11.68	11.75	11.49	16.66	7.12	12.93	12.20	12.95	13.59	16.80
Arkansas	42.32	72.97	59.41	62.05	37.55	42.96	41.89	43.94	45.78	65.33
California	21.46	20.22	16.60	36.61	19.52	19.63	14.63	18.51	30.89	22.49
Colorado	22.61	15.21	16.43	14.66	16.84	17.38	15.22	12.00	13.73	11.97
Florida	55.76	56.57	45.17	52.41	63.48	67.07	51.04	54.42	50.21	51.65
Georgia	52.88	53.45	47.21	49.82	58.50	48.08	40.45	58.07	53.90	49.78
Idaho	17.44	16.15	17.88	19.87	16.64	14.27	16.21	10.08	12.05	17.96
Illinois	43.71	47.98	47.24	43.09	39.41	34.45	32.38	37.80	35.55	38.65
Indiana	44.98	51.72	51.78	42.42	38.47	30.79	36.12	39.79	36.02	49.58
Iowa	44.16	33.40	31.54	35.69	32.23	24.70	26.31	31.44	24.95	29.48
Kansas	33.18	26.35	31.71	32.39	32.03	25.11	23.87	23.43	29.44	21.16
Kentucky	41.68	61.97	55.43	50.13	40.08	43.54	43.25	44.96	35.97	53.82
Louisiana	60.39	61.70	58.90	66.26	57.39	51.35	51.41	55.10	40.25	55.43
Maryland	41.68	42.26	42.24	42.84	39.91	49.20	37.68	44.92	59.77	45.62
Michigan	40.04	38.69	39.08	36.58	35.00	31.95	29.81	28.68	26.86	34.23
Minnesota	33.62	28.35	26.11	29.43	23.18	26.02	23.70	25.10	19.08	26.01
Mississippi	(56.00)	66.99	55.75	64.01	45.59	49.60	44.57	(50.00)	38.81	56.23
Missouri	39.28	39.96	41.63	40.45	39.94	38.91	32.77	41.22	37.91	55.71
Montana	16.00	12.54	13.50	17.87	14.15	11.98	15.98	15.03	9.24	10.78
Nebraska	30.91	23.51	30.74	24.00	25.98	23.71	22.99	22.88	22.64	17.18
Nevada	7.21	10.39	9.77	13.06	7.81	10.88	5.18	6.76	10.17	12.88
New Jersey	44.10	54.75	43.80	46.63	37.87	46.54	47.66	52.20	63.33	49.34
New Mexico	22.67	12.57	11.30	15.23	12.43	16.55	13.48	17.87	10.74	13.10
New York	35.44	35.48	35.33	35.23	37.89	37.47	36.28	43.88	47.97	49.60
North Carolina	50.81	59.73	58.23	54.42	53.73	63.06	52.09	54.98	58.76	46.49
North Dakota	15.73	21.12	16.76	20.01	17.50	16.49	19.57	16.40	11.30	17.12
Ohio	52.53	45.03	44.98	36.19	38.08	36.71	33.68	39.64	38.41	50.33
Oklahoma	(30.00)	(50.00)	(35.00)	38.39	36.36	(25.00)	27.29	23.40	30.24	38.42
Oregon	34.48	30.40	22.68	28.84	26.57	24.79	30.05	28.32	21.80	22.24
Pennsylvania	39.29	45.45	43.57	45.94	40.98	42.63	43.10	45.91	52.67	51.28
South Carolina	(50.00)	(52.00)	43.54	49.84	52.04	46.27	(50.00)	45.63	45.76	42.29
South Dakota	23.62	20.55	24.90	19.93	44.00	22.12	23.49	17.61	19.85	16.43
Tennessee	50.55	65.77	56.32	55.57	44.56	51.75	44.97	48.29	45.50	57.60
Texas	32.23	30.76	28.78	34.53	29.95	28.25	38.71	38.40	34.00	31.37
Utah	9.57	9.67	7.72	15.15	13.00	12.48	8.55	13.62	10.41	9.00
Virginia	35.40	45.83	41.24	40.54	38.56	54.09	45.38	47.44	49.59	41.62
Washington	42.17	35.28	38.01	35.74	38.99	38.55	46.71	47.90	27.91	33.66
West Virginia	49.10	(60.00)	61.53	48.85	37.23	30.80	35.33	50.84	42.19	57.53
Wisconsin	46.38	37.15	35.33	40.89	34.48	33.74	32.66	31.02	27.04	37.04
Wyoming	11.88	(12.00)	19.24	15.64	16.12	7.16	8.80	15.22	10.81	12.76
New England	46.01	41.08	38.58	48.14	43.11	45.73	47.21	53.49	47.87	49.39
Mean (United States).....	37.55	38.42	35.99	38.51	34.67	34.78	33.67	37.03	34.50	37.19

YEARS 1891-1900

State	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900
Alabama	52.85	56.81	50.11	47.42	49.92	45.25	47.30	49.09	47.84	66.16
Arizona	9.64	10.11	11.17	10.65	11.08	13.39	12.87	12.61	8.41	8.30
Arkansas	44.49	57.75	47.91	49.95	44.69	38.02	46.52	56.83	41.49	49.03
California	20.22	23.60	21.28	25.78	14.85	30.91	18.44	10.35	22.47	19.84
Colorado	19.85	15.66	12.86	14.37	18.33	15.07	19.46	14.61	14.67	14.43
Florida	43.14	47.99	53.01	52.51	45.50	49.62	56.69	48.36	53.93	61.19
Georgia	49.63	51.12	40.29	49.75	49.57	45.15	49.23	53.14	44.20	57.33
Idaho	16.29	17.51	19.98	20.64	13.26	21.24	19.72	14.22	17.87	16.12
Illinois	34.01	41.87	34.09	28.89	31.89	36.59	35.85	46.64	33.02	36.28
Indiana	40.05	41.83	41.84	32.21	30.99	40.62	40.44	45.71	34.97	37.83
Iowa	32.80	36.58	27.59	21.94	26.77	37.23	26.98	31.34	28.68	35.05
Kansas	31.14	29.02	20.25	20.72	28.08	28.72	24.45	31.79	26.26	27.96
Kentucky	49.69	44.25	44.71	34.81	33.47	44.68	46.72	52.38	46.38	44.40
Louisiana	51.55	61.67	50.13	50.94	54.56	46.36	51.60	63.60	42.29	65.40
Maryland and Delaware	50.20	39.39	38.78	38.24	34.47	37.11	44.97	42.11	40.84	36.66
Michigan	30.65	33.69	34.55	28.00	26.90	31.74	31.23	32.29	28.35	32.31
Minnesota	24.52	28.38	24.45	21.63	22.68	31.02	27.23	24.21	30.14	29.79
Mississippi	56.24	57.47	51.54	47.00	47.69	43.13	46.62	54.58	44.52	66.54
Missouri	35.04	42.78	38.19	33.18	39.30	44.63	38.82	53.67	37.32	38.34
Montana	18.03	14.32	13.88	15.28	12.97	17.80	15.71	16.82	15.28	13.34
Nebraska	30.62	16.14	16.50	13.30	18.70	26.17	23.54	20.70	19.51	24.46
Nevada	14.06	10.54	9.22	10.89	7.90	10.61	9.79	6.49	9.12	8.25
New Jersey	47.88	42.04	47.90	47.37	37.29	42.51	51.72	52.35	45.84	42.71
New Mexico	14.84	9.51	12.40	10.47	15.86	13.23	16.52	14.08	10.98	13.62
New York	38.13	43.77	42.34	38.78	38.35	38.93	40.30	43.56	34.18	38.05
North Carolina	54.55	47.04	52.66	46.57	40.23	47.54	46.06	50.04	52.08	45.40
North Dakota	22.25	18.94	15.91	15.64	17.32	22.57	15.85	15.17	17.67	13.96
Ohio	38.61	37.16	30.63	29.75	28.46	39.63	35.78	33.78	34.32	32.52
Oklahoma	22.31	35.79	25.49	25.57	35.08	23.78	30.61	36.44	36.99	32.60
Oregon	20.16	27.87	29.57	32.52	26.17	33.13	28.60	21.02	31.06	24.57
Pennsylvania	45.65	41.30	44.26	43.69	33.51	41.05	42.73	45.49	40.98	37.51
South Carolina	(50.00)	47.36	53.68	50.49	48.99	44.95	46.40	46.76	49.79	49.79
South Dakota	20.05	24.41	17.93	15.30	16.05	24.14	21.09	16.50	20.16	23.05
Tennessee	52.80	54.17	45.58	42.85	43.10	47.00	50.90	50.45	47.07	47.42

TABLE 486.—Annual rainfall by States, 1881-1930—Continued

YEARS 1891-1900—Continued

State	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900
Texas.....	30.45	29.40	20.47	27.65	32.92	27.41	27.32	28.43	28.70	42.17
Utah.....	14.36	9.50	11.56	11.43	10.66	12.20	14.65	10.61	12.10	8.38
Virginia.....	48.74	40.01	46.83	35.97	38.09	42.89	40.81	44.80	43.18	39.33
Washington.....	43.32	32.97	41.23	43.42	35.56	46.20	39.82	33.04	42.39	37.56
West Virginia.....	45.96	38.38	39.82	34.52	32.82	43.49	41.59	47.61	40.97	37.62
Wisconsin.....	26.14	34.95	29.80	27.14	23.14	31.21	27.75	28.07	29.83	34.65
Wyoming.....	14.90	15.44	9.86	12.14	17.71	15.27	13.24	13.07	13.58	10.95
New England.....	44.38	38.96	43.11	35.79	40.79	35.98	33.11	50.78	37.70	44.92
Mean (United States).....	35.90	34.94	33.74	31.31	31.61	33.77	33.33	36.78	32.81	35.73

YEARS 1901-1910

State	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910
Alabama.....	55.61	49.27	49.96	39.21	55.08	55.98	54.98	48.01	58.32	45.20
Arizona.....	10.61	10.32	9.87	9.84	26.60	15.90	14.66	15.55	12.60	8.99
Arkansas.....	35.28	51.70	44.62	43.45	63.65	56.67	49.71	48.88	44.05	45.21
California.....	22.12	24.22	20.69	30.39	21.59	38.70	32.49	18.78	42.13	14.77
Colorado.....	14.14	13.88	13.80	18.30	18.09	19.71	16.33	17.09	20.96	14.35
Florida.....	58.47	51.24	55.79	48.15	61.43	53.78	49.15	48.54	40.62	50.88
Georgia.....	57.58	49.99	53.84	37.17	51.03	54.60	48.73	50.03	48.31	43.60
Idaho.....	15.40	16.51	16.60	14.70	15.68	20.69	20.47	16.46	22.18	17.08
Illinois.....	25.72	41.88	34.94	37.69	36.71	37.26	40.65	35.34	43.11	32.09
Indiana.....	30.56	40.06	36.73	38.22	43.18	39.62	44.83	34.30	48.32	37.53
Iowa.....	24.41	43.82	35.39	28.51	36.56	31.60	31.61	35.09	40.01	19.87
Kansas.....	21.35	34.42	31.35	31.01	30.77	28.58	26.46	32.30	31.15	19.67
Kentucky.....	35.65	44.35	41.16	35.10	47.68	48.84	47.76	41.94	51.36	50.07
Louisiana.....	50.60	46.32	49.92	44.18	76.57	48.42	60.00	58.89	56.02	49.08
Maryland and Delaware.....	45.08	49.20	46.94	36.49	43.84	48.01	48.86	40.01	37.47	37.42
Michigan.....	28.06	32.53	32.72	29.73	33.32	31.41	30.67	29.64	32.43	25.69
Minnesota.....	24.26	29.46	32.85	29.65	33.10	31.66	24.03	29.49	29.27	14.73
Mississippi.....	50.16	48.07	46.59	41.48	65.43	54.35	54.12	54.76	57.97	47.12
Missouri.....	25.28	44.96	40.15	41.62	45.43	37.34	41.81	42.56	45.16	36.86
Montana.....	15.08	15.26	15.03	11.04	14.38	18.47	17.00	20.09	19.57	15.99
Nebraska.....	22.76	29.09	27.27	23.37	31.65	26.98	20.52	26.94	25.55	17.18
Nevada.....	13.20	7.25	7.06	10.62	8.32	15.87	13.06	6.34	11.03	5.53
New Jersey.....	51.80	59.44	56.25	43.78	42.06	46.38	51.65	42.58	40.86	39.73
New Mexico.....	14.50	9.97	11.25	14.41	20.95	15.89	16.13	12.68	12.83	9.46
New York.....	43.30	42.95	43.27	38.63	39.02	37.48	38.45	33.10	36.03	37.26
North Carolina.....	62.66	44.46	50.13	43.27	51.94	59.53	48.64	57.79	47.78	48.42
North Dakota.....	19.48	19.34	19.25	19.02	19.98	19.72	14.41	18.64	17.73	12.19
Ohio.....	32.38	37.58	36.85	36.19	39.08	36.88	42.85	34.10	42.66	36.03
Oklahoma.....	22.70	40.54	29.41	29.88	39.76	36.98	33.71	50.54	26.86	19.24
Oregon.....	24.75	29.88	24.96	32.46	21.05	29.50	31.71	20.90	32.85	26.96
Pennsylvania.....	54.54	47.29	46.27	40.44	43.34	42.78	45.45	39.58	37.38	38.99
South Carolina.....	54.98	46.43	50.87	40.98	45.10	54.81	47.79	53.33	44.61	45.31
South Dakota.....	22.76	19.92	22.92	18.46	26.68	27.95	18.92	25.10	23.69	15.49
Tennessee.....	46.96	49.42	47.23	40.74	50.85	53.86	49.14	45.59	50.63	45.17
Texas.....	22.23	33.92	33.03	30.02	41.73	31.51	33.86	32.91	23.45	21.46
Utah.....	10.05	9.17	10.21	11.43	13.58	18.34	16.07	14.82	19.31	11.25
Virginia.....	50.17	51.42	44.85	36.18	43.58	49.56	44.19	45.21	39.81	41.87
Washington.....	35.30	42.13	32.92	31.57	31.63	35.71	32.02	32.28	35.77	33.26
West Virginia.....	44.78	42.19	40.55	33.53	45.53	44.36	52.15	40.47	43.02	38.00
Wisconsin.....	26.15	22.91	35.98	31.91	35.51	35.41	31.02	28.42	31.97	21.41
Wyoming.....	12.14	9.81	12.87	14.29	16.03	17.82	14.63	17.26	16.33	12.12
New England.....	47.79	45.95	42.08	39.90	37.34	41.54	41.82	35.48	39.84	35.13
Mean (United States).....	34.24	36.30	34.97	31.97	37.24	37.39	36.17	34.24	35.92	30.11

YEARS 1911-1920

State	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Alabama.....	52.54	66.45	52.06	44.90	53.75	53.21	53.74	56.22	65.14	64.20
Arizona.....	15.35	12.64	12.02	16.85	15.50	17.06	12.83	14.74	19.19	13.25
Arkansas.....	44.63	45.83	54.01	42.85	53.08	42.18	40.72	44.64	54.62	54.28
California.....	29.39	22.27	25.20	31.13	33.82	34.84	16.48	24.47	21.29	26.71
Colorado.....	17.24	18.84	17.78	19.26	19.49	18.72	14.72	19.10	17.26	18.18
Florida.....	47.40	64.88	48.02	49.08	56.30	47.10	41.36	50.09	57.55	57.79
Georgia.....	48.23	63.02	46.47	45.58	49.63	48.50	47.41	48.73	54.91	59.73
Idaho.....	17.68	21.62	19.88	16.20	19.09	20.63	20.29	15.98	16.44	17.77
Illinois.....	38.95	35.55	35.40	28.99	41.90	37.17	32.54	37.94	37.56	32.80
Indiana.....	39.85	40.69	44.20	31.54	41.77	40.69	36.82	40.83	39.01	36.97
Iowa.....	31.37	28.65	29.95	31.93	39.53	28.90	27.81	32.78	36.76	31.75
Kansas.....	24.53	26.69	23.02	23.08	27.17	23.84	19.60	27.00	25.65	26.65
Kentucky.....	46.77	47.93	47.46	41.80	51.92	45.49	46.01	40.04	52.13	46.90
Louisiana.....	61.98	64.81	64.65	53.37	53.26	51.07	40.22	54.46	68.97	63.12
Maryland and Delaware.....	43.61	43.42	38.98	35.97	43.58	40.47	40.65	37.90	47.62	44.95
Michigan.....	34.26	32.34	29.79	30.02	30.75	33.97	27.21	29.47	30.23	29.10
Minnesota.....	29.10	22.45	25.49	28.46	28.42	28.27	20.99	24.98	27.56	25.25

TABLE 486.—*Annual rainfall by States, 1881-1930—Continued*

YEARS 1911-1920—Continued

State	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Mississippi	59.47	66.32	57.29	48.59	53.94	51.49	45.16	40.73	69.24	62.85
Missouri	38.94	38.68	37.47	34.72	49.62	40.33	31.04	37.16	40.06	37.17
Montana	18.50	17.89	15.28	15.06	18.71	18.72	14.44	13.78	11.14	14.50
Nebraska	21.03	21.81	21.97	20.78	35.60	10.08	20.80	22.36	26.48	24.92
Nevada	7.84	6.99	10.99	9.43	7.97	9.76	6.72	9.28	7.08	8.89
New Jersey	50.36	46.61	46.99	39.22	47.37	38.17	40.80	37.65	52.10	51.87
New Mexico	17.22	13.92	15.36	19.45	17.64	15.95	9.49	15.08	20.95	14.87
New York	36.61	38.34	39.66	38.39	40.91	38.03	33.73	38.23	39.69	40.57
North Carolina	42.65	47.27	52.37	47.09	50.09	50.91	49.85	50.98	48.80	56.67
North Dakota	19.40	20.34	14.69	19.16	19.42	20.50	10.92	16.02	15.76	15.34
Ohio	42.63	37.22	44.75	35.41	40.83	37.24	36.51	36.54	40.33	37.49
Oklahoma	28.93	32.60	33.07	25.72	45.41	29.47	22.39	33.55	34.91	36.35
Oregon	42.76	32.50	27.48	26.40	26.09	28.64	24.33	20.61	26.21	26.48
Pennsylvania	45.62	44.13	43.25	38.24	44.26	40.98	41.71	41.25	46.66	40.63
South Carolina	39.80	54.93	47.57	43.39	48.89	43.91	43.49	46.48	46.79	52.24
South Dakota	19.18	18.50	17.89	31.57	28.54	20.90	16.77	21.91	20.06	27.44
Tennessee	53.11	54.40	47.42	43.93	54.18	50.79	51.51	47.30	57.65	56.46
Texas	29.13	26.12	36.05	37.88	32.01	24.59	16.21	28.90	45.64	34.24
Utah	13.02	14.15	12.88	13.60	13.33	15.98	11.88	14.12	11.83	16.57
Virginia	41.60	39.19	42.75	37.17	39.72	39.36	40.82	44.43	41.66	46.30
Washington	25.97	34.15	30.42	32.19	34.43	35.93	33.80	30.12	31.00	32.64
West Virginia	47.13	43.78	49.02	39.71	43.76	44.63	44.33	44.77	47.27	41.62
Wisconsin	37.00	32.61	32.81	32.72	32.68	33.79	27.28	29.69	33.22	30.15
Wyoming	13.98	18.40	15.88	12.69	19.42	12.70	13.76	16.05	10.46	14.88
New England	38.15	42.15	39.77	34.78	40.34	40.79	38.93	38.76	43.06	48.66
Mean (United States)...	34.70	36.80	35.01	32.08	37.42	34.26	31.20	33.60	37.30	37.49

YEARS 1921-1930

State	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	Mean
Alabama	45.34	58.78	60.87	47.23	45.20	60.79	45.48	55.51	78.48	46.17	53.11
Arizona	13.95	12.76	16.95	8.68	12.77	16.49	15.68	9.67	11.14	15.21	13.06
Arkansas	47.46	46.50	59.85	37.03	42.19	40.24	65.85	50.50	46.10	46.62	49.03
California	25.89	28.95	14.13	17.05	21.13	27.06	27.60	18.64	18.00	18.38	23.62
Colorado	19.38	15.60	21.23	13.75	16.96	16.98	20.32	17.05	18.16	17.93	16.79
Florida	45.24	57.53	50.17	61.62	52.64	59.58	40.71	60.12	59.04	60.24	52.94
Georgia	40.94	55.93	52.76	54.27	41.00	50.44	40.55	59.92	69.88	40.13	50.45
Idaho	18.34	15.45	17.42	12.46	18.95	16.87	22.58	13.69	13.06	16.35	17.24
Illinois	40.74	34.15	37.99	55.81	52.83	42.04	49.38	37.40	41.94	27.59	37.28
Indiana	45.80	38.76	42.83	37.78	34.59	43.73	48.19	36.76	47.04	29.70	40.17
Iowa	32.03	29.98	29.60	31.69	24.24	33.07	29.35	35.96	30.20	26.10	31.48
Kansas	24.19	20.01	31.88	24.23	25.08	24.80	32.40	33.40	27.98	26.87	27.48
Kentucky	49.42	44.43	53.92	42.68	41.11	49.95	53.43	45.61	43.48	27.86	45.81
Louisiana	47.99	66.44	71.21	38.47	52.48	65.98	59.51	56.06	63.65	53.01	55.74
Maryland and Delaware	37.72	40.15	40.27	46.26	34.91	43.90	40.37	45.09	42.46	23.78	41.89
Michigan	31.84	32.10	28.80	29.79	25.51	33.03	31.62	33.33	31.22	22.62	31.29
Minnesota	23.00	22.95	19.81	24.77	23.93	24.68	24.44	25.56	20.56	22.69	25.61
Mississippi	48.25	59.43	71.03	40.06	49.24	56.18	55.39	51.27	60.03	47.32	53.32
Missouri	43.77	39.49	41.23	40.01	39.78	43.07	53.86	45.59	46.81	31.27	40.09
Montana	14.64	15.12	18.12	13.71	16.34	13.79	20.63	13.06	13.08	12.38	15.21
Nebraska	21.30	20.41	28.02	21.06	20.89	21.07	23.50	22.31	23.09	25.63	23.61
Nevada	8.30	9.56	8.70	5.49	10.16	6.39	7.84	4.87	5.83	9.77	9.01
New Jersey	48.16	41.57	40.88	44.17	42.15	44.41	49.68	46.22	42.96	35.28	45.89
New Mexico	16.46	10.86	19.46	10.65	13.86	17.44	13.94	15.09	16.45	14.64	14.49
New York	35.41	39.53	35.46	36.98	41.41	40.19	45.90	39.03	43.02	38.18	39.02
North Carolina	42.92	56.88	45.11	54.57	37.33	43.33	44.95	56.21	62.09	38.04	50.44
North Dakota	19.59	19.75	17.76	17.65	16.81	15.70	21.82	18.40	14.32	14.10	17.68
Ohio	42.97	37.04	39.02	37.34	34.11	43.69	43.01	34.89	45.83	27.00	38.44
Oklahoma	30.02	33.89	44.98	27.86	28.31	39.04	39.55	36.48	35.39	30.70	32.24
Oregon	27.26	28.85	28.37	21.76	28.71	25.49	31.12	22.42	19.93	19.22	26.43
Pennsylvania	41.80	34.88	39.17	43.26	37.72	43.11	47.30	42.06	44.21	28.82	42.47
South Carolina	42.83	58.17	46.60	56.99	35.82	42.63	42.16	61.66	66.13	40.15	43.99
South Dakota	18.83	21.61	22.17	18.47	15.90	17.73	23.21	17.81	20.93	18.10	20.77
Tennessee	49.94	54.35	57.83	46.20	40.50	54.69	55.98	53.13	59.78	39.80	50.80
Texas	28.64	32.91	40.34	28.50	25.79	36.33	27.77	29.03	31.17	29.67	30.39
Utah	16.51	14.38	13.80	10.57	14.50	12.43	16.58	10.70	13.60	15.14	12.67
Virginia	34.94	44.72	40.94	47.41	32.55	41.60	41.95	42.99	45.92	24.86	42.55
Washington	36.33	24.67	29.64	27.70	28.09	32.12	42.02	81.93	23.67	27.28	34.70
West Virginia	45.45	41.57	46.03	47.84	41.20	49.60	48.90	43.40	46.70	25.20	43.84
Wisconsin	30.73	31.67	28.56	33.04	27.69	35.05	30.94	33.09	28.09	25.08	31.48
Wyoming	12.58	14.16	19.31	12.69	15.62	14.58	18.16	14.23	15.06	14.70	14.17
New England	37.51	42.99	40.84	35.61	41.00	39.58	45.45	40.48	40.08	33.47	41.63
Mean (United States).....	33.22	35.49	36.37	32.26	31.58	35.86	37.58	35.87	36.73	28.81	38.74

TABLE 487.—*Production of lumber, by States, 1879, 1889, 1899, 1909, 1919, 1929, and 1930<sup>1</sup>*

State	1879	1889	1899	1909	1919	1929	1930 <sup>1</sup>
	<i>M ft. b. m.</i>	<i>M ft. b. m.</i>	<i>M ft. b. m.</i>	<i>M ft. b. m.</i>	<i>M ft. b. m.</i>	<i>M ft. b. m.</i>	<i>M ft. b. m.</i>
Alabama.....	251,851	589,480	1,101,886	1,691,001	1,798,746	2,058,964	1,341,624
Arizona.....	10,715	5,320	36,182	62,731	73,655	174,594	95,497
Arkansas.....	173,508	537,884	1,623,987	2,111,300	1,772,157	1,948,818	840,379
California.....	304,795	617,781	737,085	1,143,507	1,259,363	<sup>2</sup> 2,068,229	<sup>3</sup> 1,514,263
Colorado.....	63,792	79,951	133,746	141,710	64,864	71,535	54,638
Connecticut.....	64,427	48,957	108,093	193,371	88,705	30,157	20,525
Delaware.....	31,572	23,486	35,955	55,440	27,437	9,641	5,436
Florida.....	247,627	411,869	790,373	1,201,734	1,137,432	1,136,587	876,039
Georgia.....	451,738	575,152	1,311,917	1,342,249	893,965	1,286,250	753,484
Idaho.....	18,204	27,800	65,363	645,800	765,368	1,028,791	540,409
Illinois.....	334,244	221,810	383,469	170,181	64,628	37,881	25,213
Indiana.....	915,943	755,407	1,036,999	556,418	232,457	169,970	97,837
Iowa.....	412,378	371,166	352,411	132,021	18,493	( <sup>4</sup> )	( <sup>4</sup> )
Kansas.....	45,281	4,037	10,665	4,716	2,840	( <sup>4</sup> )	( <sup>4</sup> )
Kentucky.....	305,084	423,185	774,651	860,712	512,073	339,146	139,455
Louisiana.....	133,472	303,726	1,115,366	3,551,918	3,163,871	2,232,860	1,606,718
Maine.....	566,656	597,431	784,647	1,111,565	596,116	257,910	222,104
Maryland.....	<sup>4</sup> 127,336	82,119	183,711	267,839	113,362	54,870	47,666
Massachusetts.....	205,244	211,688	344,190	361,200	166,841	71,863	82,101
Michigan.....	<sup>4</sup> 172,572	<sup>4</sup> 300,172	3,018,338	1,839,724	876,891	571,017	466,931
Minnesota.....	563,974	1,084,377	2,342,338	1,561,508	699,339	357,180	222,389
Mississippi.....	186,747	454,417	1,206,265	2,572,669	2,390,135	2,669,496	1,484,378
Missouri.....	399,744	402,052	723,754	660,159	321,383	228,078	126,735
Montana.....	21,420	89,511	255,685	308,532	287,378	388,711	296,990
Nebraska.....	13,585	8,561	4,655	( <sup>5</sup> )	505	( <sup>5</sup> )	( <sup>5</sup> )
Nevada.....	21,845	---	726	( <sup>5</sup> )	20,335	( <sup>5</sup> )	( <sup>5</sup> )
New Hampshire.....	292,267	277,063	572,447	649,606	338,777	191,708	181,702
New Jersey.....	109,679	34,052	74,118	61,620	36,888	15,576	12,333
New Mexico.....	11,195	26,112	30,880	91,937	86,808	148,287	142,585
New York.....	1,184,220	925,417	878,448	681,440	357,764	169,591	109,617
North Carolina.....	241,822	514,692	1,286,638	2,177,715	1,654,435	1,202,377	814,835
Ohio.....	910,832	565,815	990,497	542,904	280,076	175,637	108,198
Oklahoma.....	---	2,552	22,104	225,730	165,403	199,744	183,477
Oregon.....	177,171	446,483	734,538	1,898,995	2,577,408	4,784,009	3,654,075
Pennsylvania.....	1,733,844	2,183,816	2,333,278	1,462,771	630,471	314,250	208,762
Rhode Island.....	8,489	7,633	18,528	25,489	11,030	6,514	7,019
South Carolina.....	185,772	198,764	466,429	897,680	621,679	1,067,987	707,415
South Dakota.....	29,286	<sup>6</sup> 28,283	<sup>6</sup> 33,734	31,057	42,970	61,126	59,464
Tennessee.....	302,673	480,261	950,958	1,223,849	792,132	763,828	413,937
Texas.....	328,968	642,648	1,232,404	2,099,130	1,379,774	1,451,640	1,045,262
Utah.....	25,709	14,320	17,543	12,638	11,917	5,301	6,489
Vermont.....	322,942	384,476	375,809	351,571	218,479	119,622	94,217
Virginia.....	315,939	415,512	959,119	2,101,716	1,098,038	708,452	495,489
Washington.....	180,176	1,063,584	1,429,032	3,862,916	4,961,220	7,302,063	5,502,129
West Virginia.....	180,117	301,958	778,051	1,472,942	763,103	632,992	406,033
Wisconsin.....	1,542,021	2,866,153	3,389,166	2,025,038	1,116,338	842,814	636,844
Wyoming.....	2,690	6,417	16,963	28,002	8,674	25,629	25,132
All other.....	---	<sup>7</sup> 2,816	<sup>7</sup> 6,571	<sup>8</sup> 11,230	---	<sup>9</sup> 20,332	<sup>9</sup> 13,349
United States.....	18,091,356 <sup>10</sup>	23,845,046 <sup>10</sup>	35,084,166 <sup>11</sup>	44,509,761	11,133,34,552,076 <sup>11</sup>	26,886,032 <sup>12</sup>	26,051,473

Forest Service in cooperation with Bureau of the Census.

<sup>1</sup> Preliminary.<sup>2</sup> Includes cut of Nevada.<sup>3</sup> Included in "All other."<sup>4</sup> Includes cut of District of Columbia.<sup>5</sup> Includes with California.<sup>6</sup> Includes cut of North Dakota.<sup>7</sup> Reported as cut of Alaska.<sup>8</sup> Includes cut of Nebraska and Nevada.<sup>9</sup> Includes cut of Iowa, Kansas, and Nebraska.<sup>10</sup> Excludes custom mills (3,196,527 M feet b. m.).<sup>11</sup> Includes both merchant and custom sawing.<sup>12</sup> Includes 2,655 mills cutting less than 50,000 feet each per year.<sup>13</sup> Mills cutting less than 50,000 feet each year excluded.

TABLE 488.—Average value of lumber at the mill per thousand feet board measure, in stated years

Kind of wood	1899	1909	1919	1927	1929	1930
<b>Softwoods:</b>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Balsam fir.....	(1)	13.99	32.23	25.92	25.40	26.72
Cedar.....	10.91	19.95	33.80	34.39	34.83	31.14
Cypress.....	13.32	20.46	35.38	39.01	35.29	33.10
Douglas fir.....	8.67	12.44	24.62	19.45	20.05	16.91
Hemlock.....	9.98	13.95	29.16	19.06	18.90	17.04
Larch (tamarack).....	8.73	12.68	23.39	17.69	18.35	17.18
Lodgepole pine.....	(1)	16.25	29.98	20.82	17.97	17.64
Redwood.....	10.12	14.80	30.84	33.81	31.00	30.33
Spruce.....	11.27	16.91	30.76	26.59	28.64	23.06
Sugar pine.....	12.30	18.14	35.99	43.22	43.08	38.10
Western yellow pine.....	9.70	15.39	27.75	26.04	26.47	23.52
White fir.....	(1)	13.10	25.66	19.92	20.63	17.57
White pine.....	12.69	18.16	32.83	29.90	29.87	27.81
Yellow pine.....	8.46	12.69	28.71	23.77	25.66	21.06
<b>Hardwoods:</b>						
Ash.....	15.84	24.44	52.69	43.82	43.14	39.72
Basswood.....	12.84	19.50	40.03	39.84	39.88	35.51
Beech.....	(1)	13.25	29.98	27.21	28.39	25.89
Birch.....	12.50	16.95	35.79	41.03	39.35	36.39
Chestnut.....	13.37	16.12	32.30	29.35	29.51	23.91
Cottonwood.....	10.37	18.05	32.24	30.92	29.70	22.73
Elm.....	11.47	17.52	36.39	36.22	35.28	30.20
Gum, red and sap.....	9.63	13.20	32.68	32.81	34.42	27.67
Hickory.....	18.78	30.80	44.37	37.08	40.33	33.00
Maple.....	11.83	15.77	35.56	35.35	36.93	34.54
Oak.....	13.78	20.50	37.87	35.72	38.43	29.29
Sycamore.....	11.04	14.87	30.32	29.31	30.07	26.54
Tupelo.....	(1)	11.87	28.42	24.45	25.39	23.47
Walnut.....	36.49	43.79	72.13	111.64	119.15	100.75
Yellow poplar.....	14.03	25.39	41.65	38.58	40.66	35.19
<b>All kinds.....</b>	<b>11.13</b>	<b>15.38</b>	<b>30.21</b>	<b>25.80</b>	<b>26.94</b>	<b>22.81</b>

Bureau of the Census in cooperation with the Forest Service.

<sup>1</sup> No data available.TABLE 489.—Lumber consumption per capita,<sup>1</sup> census years, 1899-1929

Year	Per capita consumption	Year	Per capita consumption	Year	Per capita consumption
	<i>Feet b. m.</i>		<i>Feet b. m.</i>		<i>Feet b. m.</i>
1899.....	55	1879.....	365	1924.....	345
1819.....	55	1889.....	435	1925.....	345
1829.....	65	1899.....	460	1926.....	335
1839.....	95	1904.....	505	1927.....	300
1849.....	235	1909.....	475	1928.....	305
1859.....	260	1914.....	400	1929.....	275
1869.....	340	1919.....	325		

Forest service.

<sup>1</sup> This table takes into account the exports and imports of lumber, and in the decade, the estimated total production as well as the increases and decreases in mill and yard stocks.

TABLE 490.—*Pulpwood consumption, wood-pulp and paper production by States in stated years*

State	Pulpwood consumption				Wood-pulp production				Paper production			
	1909	1919	1929	1930	1909	1919	1929	1930	1925	1927	1929	1930
	1,000 cords	1,000 cords	1,000 cords	1,000 cords	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons
California.....	1 52	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	1 27	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	177	219	254	231
Louisiana.....		( <sup>1</sup> )	480	423		( <sup>1</sup> )	247	244	124	204	274	273
Maine.....	904	1,280	1,312	1,203	604	917	981	905	868	954	1,061	1,029
Massachusetts.....	46	52	( <sup>1</sup> )	43	26	33	29	29	511	540	562	491
Michigan.....	133	207	313	280	64	106	178	193	847	1,004	1,092	991
Minnesota.....	47	204	266	230	37	130	190	182	224	281	318	279
New Hampshire.....	350	376	376	243	213	232	213	138	206	207	196	158
New York.....	922	1,055	826	763	980	812	663	596	1,503	1,458	1,513	1,343
North Carolina.....	145	159	( <sup>1</sup> )	( <sup>1</sup> )	54	61	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	( <sup>1</sup> )	70	65
Ohio.....	55	27	( <sup>1</sup> )	( <sup>1</sup> )	27	10	( <sup>1</sup> )	( <sup>1</sup> )	777	812	937	860
Oregon.....	104	1 172	( <sup>1</sup> )	351	84	124	257	249	146	188	223	129
Pennsylvania.....	295	424	398	353	136	215	213	189	678	716	749	665
Tennessee.....		( <sup>1</sup> )	( <sup>1</sup> )	75		( <sup>1</sup> )	( <sup>1</sup> )	53	31	33	84	97
Vermont.....	71	112	25	24	59	86	26	25	84	87	73	69
Virginia.....	92	126	375	378	49	62	206	216	143	198	242	282
Washington.....	( <sup>1</sup> )	139	956	1,000	( <sup>1</sup> )	84	524	566	179	233	332	395
West Virginia.....	109	84	( <sup>1</sup> )	( <sup>1</sup> )	49	39	( <sup>1</sup> )	( <sup>1</sup> )	49	48	52	35
Wisconsin.....	576	854	1,234	1,169	325	507	734	701	833	892	886	835
All other States.....	101	207	1,104	661	51	100	407	344	1,802	1,933	2,172	1,951
Total.....	4,002	5,478	7,645	7,196	2,491	3,518	4,863	4,830	9,182	10,002	11,140	10,169

Bureau of the Census in cooperation with the Forest Service.

<sup>1</sup> Includes Washington.<sup>1</sup> Includes California.<sup>2</sup> Included with Oregon.<sup>2</sup> Included with California.<sup>3</sup> Included in "All other States."TABLE 491.—*Pulpwood consumption, wood-pulp and paper production of the United States*

Year	Pulpwood consumption	Wood-pulp production	Paper production	Year	Pulpwood consumption	Wood-pulp production	Paper production
	Cords	Short tons	Short tons		Cords	Short tons	Short tons
1899.....	1,936,310	1,179,525	2,167,593	1919.....	5,477,832	3,517,952	6,190,361
1904.....		1,921,768	3,106,696	1920.....	6,114,072	3,821,704	7,334,614
1905.....	3,192,123			1921.....	4,557,179	2,875,601	5,356,317
1906.....	3,661,176			1922.....	5,548,842	3,521,644	7,017,800
1907.....	3,962,660	2,547,879		1923.....	5,872,870	3,785,672	8,029,482
1908.....	3,346,953	2,118,947		1924.....	5,768,082	3,723,266	
1909.....	4,001,607	2,495,523	4,216,708	1925.....	6,093,821	3,962,217	9,182,204
1910.....	4,094,306	2,533,976		1926.....	6,768,007	4,394,768	
1911.....	4,328,052	2,684,134		1927.....	6,750,935	4,313,408	10,002,070
1914.....	4,470,763	2,893,150	5,270,047	1928.....	7,180,100	4,510,809	10,403,338
1916.....	5,228,558	3,435,001		1929.....	7,645,011	4,862,885	11,140,235
1917.....	5,480,075	3,509,939	5,919,647	1930.....	7,195,524	4,680,308	10,169,140
1918.....	5,250,794	3,313,861	6,061,523				

Bureau of the Census in cooperation with the Forest Service and Federal Trade Commission.

TABLE 492.—*Pulpwood consumption, by kinds, 1909, 1919, 1929, and 1930*

Kind of wood	1909	1919	1929	1930
Spruce:	<i>Cords</i>	<i>Cords</i>	<i>Cords</i>	<i>Cords</i>
Domestic.....	1,653,249	2,313,419	2,074,267	1,844,937
Imported.....	768,332	873,795	1,029,913	888,255
Hemlock:				
Domestic.....	559,657	795,154	1,309,170	<sup>1</sup> 1,222,961
Imported.....			15,379	
Pine:				
Southern yellow pine.....	( <sup>1</sup> )	234,463	1,036,272	<sup>2</sup> 1,030,273
Jack pine.....	( <sup>1</sup> )	51,581	195,577	200,970
Miscellaneous pines.....	90,885	7,566		
Poplar:				
Domestic.....	302,876	180,160	329,466	291,897
Imported.....	25,622	158,220	157,829	159,092
Balsam fir:				
Domestic.....	95,366	181,840	317,552	330,548
Imported.....		106,974	45,412	48,935
Yellow poplar.....		72,605	129,697	107,795
White fir.....	37,176	31,138	111,054	90,652
Beech, birch, and maple.....	31,390	<sup>3</sup> 133,426	76,950	<sup>3</sup> 225,147
Gum.....		30,355	39,685	41,825
Tamarack (larch).....		44,042	51,835	40,054
Other woods.....	188,077	38,013	163,668	76,681
Slabs and mill waste.....	248,977	176,081	561,285	595,502
Total.....	4,001,607	5,477,832	7,645,011	7,195,524

Bureau of the Census in Cooperation with the Forest Service.

<sup>1</sup> Included in "Miscellaneous pines."<sup>2</sup> Includes a small quantity of imported hemlock.<sup>3</sup> Includes chestnut.TABLE 493.—*Paper: Consumption by kinds, and apparent per capita, specified years, beginning 1810*<sup>1</sup>

Year	News-print	Book	Boards	Wrapping	Fine	All other	All kinds	Apparent per capita
	<i>Thousand short tons</i>	<i>Thousand short tons</i>	<i>Thousand short tons</i>	<i>Thousand short tons</i>	<i>Thousand short tons</i>	<i>Thousand short tons</i>	<i>Thousand short tons</i>	<i>Pounds</i>
1810.....							<sup>1</sup> 3	1
1819.....							<sup>1</sup> 12	2
1839.....							<sup>1</sup> 38	4
1849.....							<sup>1</sup> 78	7
1859.....							<sup>1</sup> 127	8
1869.....							391	20
1879.....							457	18
1889.....							1,121	36
1899.....	569	314	394	535	113	233	2,158	177
1904.....	893	495	521	644	142	365	3,050	74
1909.....	1,159	659	883	763	193	537	4,224	93
1914.....	1,576	926	1,292	892	241	566	5,496	112
1917.....	1,824	846	1,805	814	276	691	6,256	122
1918.....	1,760	800	1,927	859	343	693	6,387	123
1919.....	1,892	838	1,940	825	306	692	6,493	124
1920.....	2,196	1,060	2,301	1,003	371	930	7,861	148
1921.....	2,003	707	1,641	770	230	704	6,054	112
1922.....	2,451	968	2,154	1,059	356	1,015	8,003	146
1923.....	2,814	1,235	2,803	1,177	374	938	9,340	167
1925.....	3,073	1,365	3,290	1,287	472	1,103	10,590	184
1926.....	3,517	1,408	3,637	1,435	495	1,315	11,807	203
1927.....	3,492	1,265	3,737	1,515	502	1,404	11,915	202
1928.....	3,561	1,321	4,009	1,457	538	1,562	12,448	208
1929.....	3,813	1,471	4,398	1,586	593	1,490	13,351	220
1930.....	3,496	1,370	4,014	1,556	564	1,251	12,261	199

Forest Service. A computed table based on Bureau of the Census and Forest Service bulletins.

<sup>1</sup> Imports added to United States production and domestic exports deducted.<sup>2</sup> Domestic production only, value of exports and imports being approximately equal.

TABLE 494.—*Stock grazed on the national forests, and receipts, by years*

Fiscal year	Cattle	Horses	Swine	Sheep	Goats	Receipts for grazing by fiscal years
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Dollars</i>
1905.....	632,793	59,331		1,709,987		(C) 513,000
1906.....	1,015,148	(C)		5,762,200	(C)	837,005
1907.....	1,200,158	(C)		6,657,053		947,355
1908.....	1,304,142	76,008	2,076	6,960,919	126,192	1,022,516
1909.....	1,491,585	90,019	4,501	7,679,698	139,896	989,971
1910.....	1,409,873	84,552	3,145	7,558,650	90,300	927,967
1911.....	1,351,922	91,516	4,500	7,371,747	77,668	981,489
1912.....	1,403,026	95,343	4,330	7,467,890	83,849	998,369
1913.....	1,455,922	97,919	3,277	7,790,953	76,898	1,002,845
1914.....	1,517,045	99,835	3,381	7,560,186	58,616	1,130,495
1915.....	1,627,321	96,933	2,792	7,232,276	51,409	1,210,215
1916.....	1,758,764	98,903	2,968	7,843,205	43,268	1,549,795
1917.....	1,953,198	98,880	2,306	7,586,034	49,939	1,726,822
1918.....	2,137,854	102,156	3,371	8,454,240	57,968	2,609,170
1919.....	2,135,527	93,251	5,184	7,935,174	60,789	2,486,040
1920.....	2,033,800	83,015	4,066	7,271,136	53,685	
1920 <sup>a</sup> .....	88,599	6,444	1,010	553,263	8,346	2,132,075
1921 <sup>a</sup> .....	1,999,680	78,115	2,453	6,936,377	43,574	1,315,975
1922 <sup>a</sup> .....	1,882,491	67,856	2,149	6,497,912	36,153	2,341,486
1923 <sup>a</sup> .....	1,804,274	64,104	1,347	6,377,759	31,379	1,915,561
1924 <sup>a</sup> .....	1,664,067	58,184	1,560	6,301,308	29,068	1,725,377
1925 <sup>a</sup> .....	1,538,942	57,904	846	6,162,263	19,795	1,421,589
1926 <sup>a</sup> .....	1,456,858	57,396	1,085	6,212,657	15,666	1,530,952
1927 <sup>a</sup> .....	1,403,192	55,629	997	6,376,838	18,046	1,718,730
1928 <sup>a</sup> .....	1,335,903	51,956	1,206	6,497,081	17,070	1,740,290
1929 <sup>a</sup> .....	1,322,465	48,171	853	6,650,719	15,487	1,942,914
1930 <sup>a</sup> .....	1,321,431	42,357	540	6,799,236	13,496	

Forest Service.

<sup>1</sup> No data available.<sup>2</sup> Included with cattle.<sup>3</sup> Included with sheep.<sup>4</sup> Subject to revision.<sup>5</sup> Last 6 months only.<sup>6</sup> Calendar year.TABLE 495.—*Number of stock grazed on national forests, by States, calendar year 1930, and total grazing receipts, fiscal year 1930*

State	Cattle	Horses	Swine	Sheep	Goats	Receipts from grazing <sup>1</sup>
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Dollars</i>
Alabama.....	8	2				30
Arizona.....	173,788	1,533	272	354,773	426	138,481
Arkansas.....	394					408
California.....	145,583	3,997	179	414,164	1,764	196,413
Colorado.....	274,941	3,415		1,079,496	645	387,085
Florida.....	443			1,483		397
Idaho.....	114,285	7,206		1,368,127		247,383
Montana.....	125,491	8,442		638,381	75	166,561
Nebraska.....	11,255	360				8,122
Nevada.....	51,948	2,005		340,855		96,550
New Hampshire.....	130	6				249
New Mexico.....	82,049	2,964	84	225,577	10,526	88,699
North Carolina.....	259	4		34		246
Oklahoma.....	2,364	75				3,645
Oregon.....	84,754	2,635		698,506	60	187,146
South Dakota.....	26,375	1,135		32,617		23,125
Tennessee.....	290			70		212
Utah.....	108,491	3,982	5	788,441		201,035
Virginia.....	694	7				865
Washington.....	18,196	371		187,691		47,377
West Virginia.....	198	12		943		526
Wyoming.....	104,495	4,206		670,650		166,681
Total.....	1,321,431	42,357	540	6,799,236	13,496	<sup>2</sup> 1,960,642

Forest Service.

<sup>1</sup> Includes grazing trespass.<sup>2</sup> Includes Georgia \$107, Maine \$17, and South Carolina \$9.

TABLE 496.—*Free-use timber, cut from national forests, by States, 1910, 1920, 1929, and 1930*

State	Fiscal year 1910		Fiscal year 1920		Calendar year 1929		Calendar year 1930	
	Total quantity	Estimated users	Total quantity	Estimated users	Total quantity	Estimated users	Total quantity	Estimated users
	M ft. b. m.	Number	M ft. b. m.	Number	M ft. b. m.	Number	M ft. b. m.	Number
Alabama.....	184	6	1	12	533	502	510	503
Alaska.....	5,254	1,972	4,897	503	7,574	5,929	8,921	4,637
Arizona.....	513	61	6,418	4,306	25	17	132	46
Arkansas.....	7,047	3,215	5,238	1,606	8,905	2,596	3,949	3,203
California.....	12,550	3,598	9,753	3,920	7,436	2,674	9,326	3,120
Colorado.....	95	32	330	96				
Florida.....			10	8				
Georgia.....	19,937	6,472	14,455	5,530	14,636	4,797	22,631	7,289
Idaho.....			216	42	475	61	918	131
Michigan.....	381	15	160	64	167	46	183	40
Minnesota.....	14,713	5,441	8,151	4,290	10,426	6,144	16,800	11,961
Montana.....			3	3				
Nebraska.....	1,710	678	1,777	528	1,735	419	1,793	418
Nevada.....	10,004	3,801	8,859	6,472	10,614	7,246	15,818	7,797
New Mexico.....			17	12	778	406	709	371
North Carolina.....	21	62						
North Dakota.....	123	192	180	600	60	65	65	70
Oklahoma.....	10,068	2,455	7,515	1,428	6,380	1,382	8,882	1,964
Oregon.....					25	5	350	84
Pennsylvania.....			2,963	910	1,751	523	1,755	509
South Dakota.....	3,476	1,185	1,027	385	656	407	607	325
Tennessee.....			8,553	4,985	11,389	6,788	13,293	9,239
Utah.....	8,260	3,426	148	97	316	187	491	287
Virginia.....			1,026	251	727	237	1,142	316
Washington.....	2,444	503	8	3	31	10		
West Virginia.....	7,416	1,775	6,264	1,276	6,849	1,684	7,821	1,720
Wyoming.....								
Total.....	104,796	35,364	88,060	37,336	86,768	42,135	116,096	53,930

Forest Service.

TABLE 497.—*Turpentine and rosin: Industrial consumption, calendar years 1928-1930*

Industry	Turpentine			Rosin		
	1928	1929	1930	1928	1929	1930
	Gallons	Gallons	Gallons	500-pound barrels	500-pound barrels	500-pound barrels
Automobiles and wagons.....	158,901	100,815	50,953	1,214	2,797	3,523
Chemicals and pharmaceuticals.....	55,235	60,474	70,185	8,709	5,332	5,246
Foundries and foundry supplies.....	15,001	10,136	27,144	18,558	29,349	17,999
Linoleum.....	2,312	81	2,754	58,204	44,311	29,458
Matches.....	250			2,810	3,430	2,953
Miscellaneous.....	36,308	61,632	65,556	2,555	6,204	3,752
Oils and greases.....	42,969	23,380	21,776	43,009	54,427	49,528
Paper and paper size.....	4,231	6,159	1,771	333,942	388,310	341,527
Paint and varnish.....	4,306,483	4,630,505	4,069,743	245,157	283,942	192,878
Printing ink.....	10,131	14,232	11,209	14,815	15,269	13,104
Sealing wax, pitch, insulations, and plastics.....	68,248	75,280	70,236	34,537	40,892	26,291
Shipyards, car shops, etc.....	41,315	62,865	65,520	104	790	3,086
Shoe polish.....	501,116	567,920	527,838	635	719	610
Soap.....	1,599	4,215	10,639	182,533	228,599	218,967
Total.....	5,304,099	5,622,695	5,045,224	947,387	1,104,771	908,422

Bureau of Chemistry and Soils. A few concerns did not report; to cover these, estimates were made. The estimated quantities consumed by the nonreporting concerns are less than 5 per cent of the total.

MISCELLANEOUS AGRICULTURAL STATISTICS

929

TABLE 498.—*Hunters' licenses issued by States, with total money returns, for the seasons 1928-29 and 1929-30*

State	Licenses issued						Money returns <sup>1</sup>	
	Resident		Nonresident and alien		Total		1928-29	1929-30
	1928-29	1929-30	1928-29	1929-30	1928-29	1929-30		
Alaska.....	( <sup>2</sup> )	( <sup>2</sup> )	227	214	227	214	\$16,490.00	\$14,950.00
Alabama.....	81,515	84,794	197	223	81,712	85,017	124,594.00	117,478.61
Arizona.....	26,697	29,175	821	950	27,518	30,125	85,318.50	113,602.50
Arkansas.....	90,000	83,000	1,500	1,830	91,500	84,830	112,500.00	112,575.00
California.....	238,569	229,767	2,878	2,203	241,447	231,970	488,114.32	464,157.00
Colorado.....	110,084	110,888	397	323	110,481	111,211	286,401.50	241,505.25
Connecticut.....	35,938	28,465	601	587	36,537	29,052	99,959.75	109,680.00
Delaware.....	2,054	2,193	380	162	2,434	2,355	5,685.00	4,622.00
Florida.....	43,606	47,670	588	566	44,174	48,236	180,529.00	123,164.00
Georgia.....	65,977	47,006	202	162	66,179	47,168	91,583.22	69,090.67
Idaho.....	83,243	86,004	439	506	83,682	86,510	165,213.90	171,747.65
Illinois.....	300,413	340,547	2,283	1,999	302,696	342,546	335,799.50	288,233.00
Indiana.....	309,191	304,444	468	342	309,659	304,786	268,644.00	279,261.80
Iowa.....	173,116	227,483	200	248	173,316	227,731	175,116.00	231,203.00
Kansas.....	127,926	143,539	109	93	128,035	143,632	128,931.00	144,934.00
Kentucky.....	104,213	113,220	298	470	104,499	113,690	107,216.00	100,807.00
Louisiana.....	99,632	107,844	435	314	100,067	108,158	110,332.00	115,794.00
Maine.....	34,748	78,959	3,864	4,639	38,612	83,598	52,350.70	97,321.45
Maryland.....	66,766	71,676	1,800	1,979	68,566	73,555	130,101.55	140,004.55
Massachusetts.....	118,014	118,861	3,462	3,585	121,476	122,446	255,014.00	257,135.00
Michigan.....	317,622	404,129	2,434	2,704	320,056	406,833	400,510.99	625,601.25
Minnesota.....	110,638	245,972	364	368	110,900	246,340	107,674.84	279,324.55
Missouri.....	254,740	230,714	842	721	255,582	231,435	308,511.18	322,189.80
Montana.....	79,227	83,388	274	212	79,501	83,600	156,115.20	170,705.00
Nebraska.....	170,895	187,231	178	141	171,073	187,372	174,250.00	191,041.00
Nevada.....	7,448	7,142	151	134	7,599	7,276	11,938.50	21,555.00
New Hampshire.....	56,241	83,716	2,590	2,376	58,831	86,091	114,775.35	134,999.60
New Jersey.....	195,121	195,216	2,139	1,765	197,260	196,971	314,071.50	279,336.60
New Mexico.....	17,586	18,249	1,381	1,635	18,967	19,894	62,000.00	95,035.25
New York.....	671,728	717,106	5,409	4,065	677,137	721,171	703,047.87	735,295.44
North Carolina.....	117,691	124,284	1,221	1,275	118,912	125,509	188,819.50	205,433.60
North Dakota.....	34,108	33,550	168	156	34,271	33,706	55,237.00	50,834.90
Ohio.....	881,817	443,329	29	68	881,846	443,397	332,252.00	447,799.00
Oklahoma.....	158,822	127,841	388	858	159,206	128,729	164,451.50	132,945.00
Oregon.....	60,818	64,814	598	609	61,411	64,923	222,785.50	233,778.00
Pennsylvania.....	516,603	505,108	1,190	4,823	517,793	509,928	968,834.70	1,029,745.70
Rhode Island.....	9,426	9,503	299	263	9,725	9,766	22,900.00	21,703.00
South Carolina.....	89,896	99,521	1,384	1,588	90,780	101,119	142,026.00	158,751.00
South Dakota.....	113,229	107,846	2,838	2,795	116,067	110,141	192,891.00	186,057.00
Tennessee.....	63,741	113,833	293	478	64,034	114,350	80,152.00	219,652.95
Texas.....	113,833	113,047	517	478	114,350	113,525	221,965.00	219,652.95
Utah.....	15,841	47,655	253	279	16,094	47,934	33,507.60	110,829.00
Vermont.....	40,678	39,737	1,312	1,141	41,990	40,878	60,349.80	57,644.95
Virginia.....	140,607	143,790	2,687	2,693	143,294	151,483	239,560.30	259,303.55
Washington.....	204,696	211,118	647	876	205,343	211,994	371,981.00	381,684.00
West Virginia.....	135,684	145,809	489	295	136,153	146,104	176,916.00	189,112.50
Wisconsin.....	153,840	204,855	229	314	154,069	205,169	143,881.00	195,969.50
Wyoming.....	28,045	21,169	676	412	28,721	21,581	110,603.00	86,044.50
Total.....	6,376,699	6,848,219	52,062	54,798	6,428,761	6,903,017	9,391,412.33	10,013,925.72

Bureau of Biological Survey.

<sup>1</sup> Includes amounts received from combined hunting and fishing licenses, but not from licenses to fish only.

<sup>2</sup> No resident license required.

<sup>3</sup> Combined hunting and fishing license.

<sup>4</sup> Totals are exclusive of Mississippi for both seasons and of Tennessee for the 1929-30 season, as the figures are not available. Figures given include combined hunting and fishing licenses, which for many States can not be separated, many such licenses being taken out by anglers only.

TABLE 499.—Current status of Federal-aid and emergency road construction as of June 30, 1931

State	Com- pleted	Under construction				Approved for construction				Balance of Federal aid funds avail- able for new projects				
		Estimated total cost	Federal aid allotted	Emergency advance fund 1	Mileage		Estimated total cost	Federal aid allotted	Emergency advance fund 1		Mileage			
					Initial 2	Stage 3					Initial 1	Stage 1	Total	
Alabama.....	2,115.8	7,537,014.55	3,071,288.23	1,594,430.71	236.7	114.8	351.5	93,312.53	49,650.20	34,691.68	1.4	2.7	4.1	\$3,201,396.79
Arizona.....	841.9	6,419,231.92	4,295,941.88	2,000,000.52	290.0	229.3	519.3	84,143.72	54,813.77	13,604.20	2.4	6.1	7.5	92,074.93
Arkansas.....	1,737.7	9,139,101.13	4,354,305.88	2,373,157.00	235.6	102.1	337.7	1,491,745.71	713,622.80	291,467.20	23.7	29.9	53.6	114,579.83
California.....	1,928.0	12,395,680.82	6,200,180.73	2,872,268.00	293.4	103.5	396.9	1,804,146.84	983,854.92	461,871.71	60.4	60.4	120.8	928,385.10
Colorado.....	1,348.3	6,781,306.19	3,115,215.63	1,381,888.20	203.2	89.0	292.2	328,975.26	176,940.82	51,871.65	15.9	21.4	37.3	1,903,342.74
Connecticut.....	256.9	4,982,568.48	1,794,280.20	820,401.00	49.0	—	49.0	377,662.56	176,940.82	—	6.5	—	6.5	4,388.95
Delaware.....	306.0	1,041,247.28	610,899.13	400,000.00	52.6	—	52.6	180,024.00	90,012.00	—	—	—	—	73,516.71
Florida.....	6,434.8	4,434,869.86	3,007,205.42	1,029,346.35	175.5	—	175.5	1,020,810.84	90,408.41	—	13.8	—	13.8	1,604,812.74
Georgia.....	2,765.9	9,001,537.69	4,302,305.86	1,818,777.17	303.1	113.8	416.9	1,555,933.35	730,085.16	46,300.00	77.7	18.2	95.9	1,049,771.28
Idaho.....	1,231.9	4,065,734.91	2,297,771.02	869,834.62	271.2	32.9	304.1	937,824.35	574,435.01	137,770.21	58.3	55.9	114.2	385,029.73
Illinois.....	2,237.7	25,022,968.77	11,785,892.09	2,376,700.00	766.3	41.1	810.4	8,257,424.68	3,778,078.05	1,012,300.00	271.9	4.7	276.6	279,005.33
Indiana.....	1,579.0	6,200,988.89	3,144,076.10	1,093,809.00	281.3	—	281.3	3,090,777.18	1,552,388.00	123,000.00	120.5	—	120.5	765,222.13
Iowa.....	8,143.8	7,396,346.86	3,247,355.40	1,535,905.37	197.3	72.1	269.4	540,700.61	182,468.80	—	—	—	—	4,059.10
Kansas.....	3,143.8	8,883,373.59	4,247,355.40	1,535,905.37	505.6	65.8	571.4	1,880,912.21	898,140.63	239,600.00	60.8	19.8	80.6	188,569.55
Kentucky.....	1,510.0	7,430,643.91	3,259,483.02	1,195,100.78	284.4	131.1	415.5	1,220,355.82	58,515.89	10,000.00	—	—	—	253,076.15
Louisiana.....	1,418.9	8,422,172.79	4,004,813.00	1,137,927.00	245.9	19.3	265.2	120,355.82	58,515.89	43,000.00	6.1	—	6.1	612,261.07
Maine.....	603.2	4,337,397.40	1,642,395.30	882,772.49	101.0	—	101.0	1,081,671.79	470,883.82	—	19.9	—	19.9	612,261.07
Maryland.....	707.0	1,652,158.40	753,443.81	382,772.49	47.9	4.2	52.1	405,155.40	202,577.00	—	17.7	—	17.7	1,597,188.35
Massachusetts.....	1,804.8	6,210,109.31	2,276,926.32	802,509.00	78.9	—	78.9	1,407,104.61	693,500.20	295,000.00	17.0	—	17.0	1,073,791.90
Michigan.....	1,804.8	6,210,109.31	2,276,926.32	802,509.00	78.9	—	78.9	1,407,104.61	693,500.20	295,000.00	17.0	—	17.0	1,073,791.90
Minnesota.....	3,897.3	7,643,473.84	3,237,288.25	1,954,993.00	74.3	284.5	358.8	1,278,434.70	546,474.69	300,908.89	5.6	49.6	55.2	27,432.47
Mississippi.....	1,772.7	4,089,403.10	2,013,896.18	1,401,409.53	182.0	80.5	262.5	402,117.91	201,088.94	213,472.79	2.5	13.3	15.8	3,769,045.69
Missouri.....	2,656.1	9,919,070.52	2,234,272.94	883,272.94	246.8	65.0	311.8	1,979,887.13	844,922.95	5,500.00	36.9	25.2	62.1	20,847.48
Montana.....	1,835.1	11,719,228.80	6,597,231.21	2,367,674.28	893.2	167.9	1,061.1	4,388,578.99	2,243,222.95	108,165.89	18.8	29.8	48.6	804,033.63
Nebraska.....	3,848.9	9,110,895.80	4,298,494.24	1,577,666.73	245.9	108.7	354.6	1,633,246.56	789,796.58	200,866.44	3.4	7.3	10.7	94,801.98
Nevada.....	1,092.0	2,946,221.13	1,983,134.43	813,056.03	108.0	248.6	356.6	628,107.07	385,796.58	130,000.00	—	—	—	1,177,568.27
New Hampshire.....	392.9	1,343,033.46	515,208.60	270,000.00	26.1	1.0	27.1	144,716.24	3,420.00	—	—	—	—	86,756.88
New Jersey.....	655.2	6,209,545.44	1,794,968.33	1,170,770.59	74.7	—	74.7	1,447,716.24	67,700.35	220,000.00	115.9	—	115.9	15,421.72
New Mexico.....	1,927.9	6,820,755.52	4,117,269.64	1,239,480.49	251.5	145.5	397.0	1,077,277.63	428,525.00	—	—	—	—	1,608,127.62
New York.....	2,694.0	39,415,270.33	13,701,573.50	3,713,566.00	690.9	7.0	697.9	6,191,200.00	428,525.00	118,927.76	22.0	38.4	60.4	1,087,249.63
North Carolina.....	1,970.6	6,565,115.87	3,128,179.57	1,626,473.82	213.3	35.4	248.5	1,023,085.04	503,233.00	118,900.00	90.4	194.9	285.3	1,286,446.47
North Dakota.....	4,363.2	8,377,946.70	2,283,117.87	901,888.96	453.3	437.4	890.7	5,066,666.41	1,974,856.43	1,808,814.37	95.9	8.4	104.3	8,011.61
Ohio.....	2,553.6	15,288,338.93	4,780,217.25	1,830,099.07	231.1	21.6	252.7	5,066,666.41	1,974,856.43	1,808,814.37	95.9	8.4	104.3	8,011.61
Oklahoma.....	1,981.3	7,764,820.32	3,678,809.67	1,601,769.48	298.4	117.7	416.1	1,078,316.17	576,490.44	292,423.05	38.0	13.9	51.9	442,316.97
Oregon.....	2,267.4	7,564,517.07	4,175,255.21	1,712,636.04	254.8	90.3	345.1	728,600.13	392,847.87	787,079.41	96.4	8.4	104.8	1,198,378.69
Pennsylvania.....	2,094.7	12,715,897.38	5,194,833.26	2,400,000.00	42.1	—	42.1	2,700,355.73	1,45,732.80	—	—	—	—	1,98,072.80
Rhode Island.....	215.4	2,621,715.53	976,610.80	400,000.00	42.1	—	42.1	91,465.74	—	—	—	—	—	—

South Carolina.....	1,853.5	5,423,297.93	2,457,103.74	1,114,636.00	78.2	162.8	231.0	512,532.94	254,606.69	37,000.00	16.1	47.1	62.2	242,641.12
South Dakota.....	3,741.6	6,206,502.83	3,334,679.87	1,220,339.54	419.4	188.4	607.8	380,641.70	100,320.84	435,636.91	28.0	51.2	26.0	883,052.23
Tennessee.....	1,461.4	4,542,803.15	2,237,133.62	1,741,881.99	193.7	17.4	211.1	2,777,023.12	1,229,705.88	221,262.73	87.6	51.2	138.8	1,838,996.09
Texas.....	6,979.5	20,083,372.66	9,176,196.78	4,649,762.26	838.4	324.4	1,182.8	819,142.92	453,403.55	221,262.73	31.2	92.8	194.0	3,266,872.24
Utah.....	1,041.5	2,204,496.97	1,284,762.41	608,169.04	133.9	38.9	172.8	99,416.46	25,868.93	10,785.65	2.3	6	2.3	624,243.33
Vermont.....	301.6	1,291,826.51	629,907.88	365,064.10	30.5	4.7	35.2	497,760.77	246,236.51	6,200.00	18.4	17.1	18.0	578,394.71
Virginia.....	1,624.7	6,193,760.18	2,810,605.22	1,457,161.72	290.9	46.2	307.1	774,880.71	323,442.43	61,308.65	12.7	17.1	23.8	863,899.62
Washington.....	1,001.4	6,833,992.87	2,690,939.02	1,168,780.49	175.7	26.8	202.5	626,633.87	274,083.33	135,880.00	9.1	12.9	22.0	334,336.98
West Virginia.....	772.6	5,165,102.15	2,037,767.87	683,627.31	129.9	12.5	142.4	1,690,746.84	562,719.04	182,211.21	48.9	17.6	60.6	82,080.01
Wisconsin.....	2,414.8	8,618,261.82	3,703,295.04	1,805,000.00	228.9	74.5	303.4	311,633.88	165,516.00	115,600.00	10.7	43.9	64.6	162,707.71
Wyoming.....	1,629.0	4,684,178.27	2,794,033.08	899,874.51	351.0	242.4	593.4	82,394.99	22,869.00	115,600.00	1.5	1.5	1.5	1,579,975.17
Hawaii.....	47.6	1,426,014.40	580,743.37	894,628.88	41.1	-----	41.1	-----	-----	-----	-----	-----	-----	-----
Total.....	88,713.1	1,387,399,991.92	172,587,244.03	87,308,514.17	12,306.8	4,174.0	479.8	165,463,602.80	865,946,865.47	470,225.64	1,045.6	1,033.3	978.9	3,939,638,883.04

Bureau of Public Roads.

1 On Dec. 20, 1930, an emergency advance fund of \$30,000,000 was authorized to be advanced to the States as a loan and to be used in matching regular Federal-aid authorizations. This fund was available for use only on work performed prior to Sept. 1, 1931. The Federal government is to be repaid for such loans by deductions from subsequent Federal-aid apportionments.

2 Initial Federal-aid construction refers to projects which are being improved with Federal aid for the first time. Such projects may or may not have been previously improved. The term stage construction refers to additional work done on projects previously improved with Federal aid. In general, such additional work consists of the construction of a surface of higher type than was provided in the initial improvement.

TABLE 500.—Federal-aid highway system: Mileage, Federal-aid apportionment for fiscal year 1932, and total apportionment for years 1917 to 1933, inclusive

State	Mileage in approved system June 30, 1931	Apportionment for fiscal year 1932 <sup>1</sup>	Aggregates of apportionments for fiscal years 1917 to 1933, inclusive
	<i>Miles</i>	<i>Amount</i>	<i>Amount</i>
Alabama.....	3,931	\$2,250,169.00	\$26,466,617.00
Arizona.....	1,979	1,556,080.80	17,893,597.80
Arkansas.....	4,953	1,846,477.80	21,632,105.60
California.....	4,889	4,121,020.40	42,020,084.40
Colorado.....	3,584	1,088,953.60	23,103,140.80
Connecticut.....	904	637,401.80	5,086,063.80
Delaware.....	608	528,375.00	5,320,692.00
Florida.....	1,626	1,437,372.40	15,315,624.40
Georgia.....	5,557	2,733,344.80	33,759,273.80
Idaho.....	3,116	1,330,448.00	15,805,218.00
Illinois.....	6,772	4,476,553.80	54,049,531.80
Indiana.....	4,740	2,698,897.20	33,031,792.20
Iowa.....	7,214	2,799,806.20	35,069,285.20
Kansas.....	7,920	2,839,068.80	35,363,804.80
Kentucky.....	3,699	1,994,012.00	24,133,801.00
Louisiana.....	2,725	1,537,800.60	17,353,278.60
Maine.....	1,676	944,168.20	11,699,768.20
Maryland.....	1,528	895,408.60	10,831,826.60
Massachusetts.....	1,437	1,511,244.00	18,523,440.00
Michigan.....	5,242	3,338,014.60	37,638,783.60
Minnesota.....	6,885	2,976,273.40	35,921,156.40
Mississippi.....	3,661	1,907,440.80	22,386,387.80
Missouri.....	7,530	3,314,415.40	41,240,932.40
Montana.....	5,127	2,230,177.00	25,488,681.00
Nebraska.....	5,574	2,256,040.80	26,943,722.80
Nevada.....	1,560	1,392,753.40	16,259,531.40
New Hampshire.....	988	529,375.00	6,016,126.00
New Jersey.....	1,315	1,463,493.60	15,868,408.60
New Mexico.....	3,616	1,732,343.40	20,243,450.40
New York.....	6,732	5,342,506.80	62,299,059.80
North Carolina.....	4,374	2,550,007.00	29,163,944.00
North Dakota.....	7,439	1,710,936.60	20,057,882.60
Ohio.....	5,899	3,971,690.40	47,164,053.40
Oklahoma.....	5,769	2,533,034.80	29,711,400.80
Oregon.....	3,247	1,763,260.60	20,205,543.60
Pennsylvania.....	6,335	4,640,667.40	57,031,871.40
Rhode Island.....	452	529,375.00	5,514,203.00
South Carolina.....	3,232	1,469,603.80	17,996,835.80
South Dakota.....	6,193	1,765,764.40	20,720,404.40
Tennessee.....	3,733	2,302,158.60	27,794,856.60
Texas.....	11,722	6,770,221.00	79,124,722.00
Utah.....	1,751	1,223,580.80	14,424,142.80
Vermont.....	1,036	529,375.00	6,115,141.00
Virginia.....	3,650	1,992,380.60	24,575,820.60
Washington.....	3,033	1,681,216.40	19,124,598.40
West Virginia.....	2,216	1,162,217.20	13,543,177.20
Wisconsin.....	5,493	2,640,713.00	31,834,206.00
Wyoming.....	3,498	1,359,009.40	15,882,807.40
Hawaii.....	217	529,375.00	3,619,923.00
Total.....	196,877	105,875,000.00	1,240,375,000.00

Bureau of Public Roads.

<sup>1</sup> Net apportionment after deduction of \$16,000,000 in repayment of emergency advance funds.

TABLE 501.—Mileage of roads in State highway systems, including Federal-aid system, at end of 1930 and total mileage 1921, 1923-1930, as reported by State highway departments

State	Total system mileage	Earth non-surfaced		Surfaced roads by types							
		Unimproved	Improved to grade	Total surfaced mileage	Sand-clay, top-soil	Gravel, chert, etc.	Water-bound macadam (treated and untreated)	Bituminous macadam	Bituminous concrete (including sheet asphalt)	Portland cement concrete	Brick and block
	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles
Alabama.....	5,826	1,127	811	3,588	959	1,826	28	165	124	456	-----
Arizona.....	2,632	475	204	1,864	130	1,804	-----	24	66	140	-----
Arkansas.....	8,810	632	1,312	6,866	-----	5,697	-----	136	350	683	-----
California.....	6,589	1,677	430	4,482	-----	1,813	-----	869	636	1,634	-----
Colorado.....	2,234	4,176	683	4,375	76	3,905	-----	-----	-----	330	-----
Connecticut.....	2,234	95	-----	2,139	-----	302	-----	892	304	155	485
Delaware.....	2,817	-----	817	-----	-----	47	-----	17	48	19	680
Florida.....	6,663	2,654	215	3,794	812	8	1,851	148	224	453	268
Georgia.....	7,124	2,853	355	5,916	1,770	766	-----	269	167	676	1
Idaho.....	4,565	1,361	445	2,759	11	2,517	-----	22	152	57	-----
Illinois.....	8,589	1,923	263	7,703	-----	3	1	544	14	7,541	139
Indiana.....	6,111	-----	125	6,986	-----	1,875	974	544	44	2,459	90
Iowa.....	7,685	636	513	6,538	-----	3,039	-----	172	3	3,464	83
Kansas.....	8,690	3,945	505	4,240	2,635	4,587	-----	-----	-----	781	182
Kentucky.....	15,000	6,223	623	8,154	-----	3,162	3,984	625	21	436	26
Louisiana.....	10,509	2,662	298	7,549	-----	6,894	7	16	123	533	8
Maine.....	2,039	162	1	1,886	4	1,508	-----	237	-----	126	-----
Maryland.....	3,253	-----	-----	3,253	-----	520	1,145	48	150	1,386	1
Massachusetts.....	1,624	-----	-----	1,624	-----	60	194	852	230	285	3
Michigan.....	3,109	459	93	7,557	100	3,488	537	111	881	2,928	12
Minnesota.....	6,891	-----	97	6,794	195	5,165	-----	-----	77	1,340	17
Mississippi.....	6,101	170	594	5,337	1	4,853	11	51	21	367	13
Missouri.....	8,446	2,043	755	5,638	-----	2,918	-----	130	-----	2,569	21
Montana.....	8,148	5,648	654	1,846	51	1,737	-----	17	7	34	-----
Nebraska.....	9,752	4,316	652	4,784	84	4,368	-----	-----	17	264	51
Nevada.....	3,774	1,902	131	1,741	-----	1,662	-----	26	2	51	-----
New Hampshire.....	2,548	11	103	2,434	-----	1,920	118	173	56	167	-----
New Jersey.....	1,873	15	17	1,841	-----	216	81	84	353	1,106	51
New Mexico.....	9,334	5,016	1,647	2,671	-----	2,585	-----	-----	1	85	-----
New York.....	14,015	2,720	51	11,244	-----	124	1,672	3,658	434	5,133	243
North Carolina.....	8,705	118	857	7,730	2,977	538	190	598	957	2,434	36
North Dakota.....	7,401	2,679	1,539	3,183	-----	3,172	-----	-----	1	10	-----
Ohio.....	11,943	27	62	11,254	-----	4,108	1,435	1,591	435	2,265	1,420
Oklahoma.....	6,895	2,475	579	3,341	-----	1,747	-----	-----	275	1,279	40
Oregon.....	4,352	339	409	3,604	-----	2,380	-----	324	684	216	-----
Pennsylvania.....	13,501	-----	4,006	9,495	-----	852	2,365	408	484	5,018	368
Rhode Island.....	1,009	257	181	571	-----	26	106	204	124	111	-----
South Carolina.....	5,993	887	240	4,866	2,842	514	43	11	445	1,011	-----
South Dakota.....	5,976	628	1,364	3,984	20	3,911	-----	-----	-----	45	-----
Tennessee.....	7,044	447	637	5,960	-----	2,534	1,329	782	218	1,080	17
Texas.....	18,703	5,485	2,410	10,808	935	6,000	990	503	199	2,123	58
Utah.....	3,436	360	1,172	1,904	-----	1,605	-----	5	67	227	-----
Vermont.....	4,204	34	618	3,552	1,000	2,168	49	73	3	259	-----
Virginia.....	7,688	1,511	575	5,602	504	2,201	1,283	847	70	697	-----
Washington.....	3,248	268	113	2,847	-----	2,067	-----	-----	60	715	5
West Virginia.....	4,164	608	469	3,087	-----	920	198	920	153	762	134
Wisconsin.....	10,221	-----	856	9,365	46	5,431	531	144	16	3,196	1
Wyoming.....	3,127	971	506	1,650	-----	1,615	-----	-----	27	8	-----
Total, 1930.....	324,496	69,910	28,365	226,221	15,152	106,728	20,229	14,590	8,071	53,208	3,243
Total—1929.....	314,163	77,259	28,553	208,324	15,442	97,838	19,931	14,043	7,220	50,684	3,266
1928.....	306,442	81,549	31,755	193,128	13,499	93,124	18,142	15,200	6,890	42,957	3,326
1927.....	293,853	86,817	29,970	176,566	12,581	86,095	17,752	13,496	6,398	36,915	3,329
1926.....	287,928	96,413	28,786	163,069	11,396	79,286	18,423	12,927	5,708	31,936	3,381
1925.....	274,911	103,271	26,786	144,854	11,025	68,771	16,709	12,105	5,414	27,645	3,185
1924.....	261,216	94,651	24,456	132,109	10,446	63,158	17,033	10,346	5,211	22,825	3,090
1923.....	251,611	103,843	36,368	111,400	8,875	52,917	15,422	8,847	4,558	17,916	2,865
1921.....	209,242	102,963	21,421	84,868	8,622	36,458	16,978	6,749	2,840	10,114	2,089

Bureau of Public Roads.

1 Includes 1,008 miles of miscellaneous surfacing not allocated by types.

TABLE 502.—Total State highway income and funds available 1930, as reported by State authorities

State	Total funds available	Balances at first of year	Total income for State highways	State taxes and appropriations	Motor vehicle fees	Gasoline tax receipts	From counties and miscellaneous	State highway bonds sold	Federal-aid road funds used
	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars
Alabama.....	17,655	3,360	14,295	-----	2,861	3,506	1,070	5,251	1,017
Arizona.....	5,330	457	4,873	709	778	1,662	66	-----	1,658
Arkansas.....	48,365	1,147	47,218	-----	2,607	6,729	54	35,580	2,248
California.....	49,744	13,646	36,098	4,597	4,195	22,433	941	-----	3,932
Colorado.....	10,086	2,177	7,909	4,471	834	4,171	134	-----	2,290
Connecticut.....	15,890	1,107	14,783	-----	8,430	4,481	1,883	-----	489
Delaware.....	8,710	6	8,704	5,579	1,611	1,083	100	-----	381
Florida.....	10,932	957	9,975	-----	3,376	4,528	841	-----	1,230
Georgia.....	14,339	719	13,620	-----	4,190	8,068	791	-----	573
Idaho.....	6,780	459	6,321	325	193	2,969	828	1,000	1,016
Illinois.....	70,103	6,684	63,444	167	18,354	140,486	847	-----	4,090
Indiana.....	24,055	705	23,349	-----	5,019	14,194	1,064	-----	2,072
Iowa.....	55,077	7,281	48,796	-----	11,902	5,965	284	26,789	3,876
Kansas.....	19,364	1,537	17,827	-----	5,965	9,047	442	-----	2,373
Kentucky.....	28,788	2,737	26,051	820	4,148	8,453	2,080	8,449	2,671
Louisiana.....	33,519	7,573	25,946	429	4,632	7,335	2,106	11,260	184
Maine.....	17,711	1,021	16,690	1,044	3,103	4,612	3,380	3,335	1,216
Maryland.....	20,143	4,045	16,103	2,723	2,468	5,866	1,922	2,377	757
Massachusetts.....	29,214	5,345	23,869	1,150	7,186	10,505	3,764	-----	1,264
Michigan.....	51,448	2,851	48,597	-----	22,041	21,825	2,428	-----	2,303
Minnesota.....	46,670	11,668	35,002	1,960	11,008	9,173	34	9,177	3,650
Mississippi.....	5,398	790	4,608	-----	72	2,817	1,157	-----	462
Missouri.....	48,922	5,826	43,096	-----	10,049	8,789	723	20,053	3,482
Montana.....	6,015	158	5,857	-----	-----	2,976	253	-----	2,628
Nebraska.....	11,469	870	10,599	107	1,275	7,021	108	-----	2,083
Nevada.....	2,529	101	2,428	106	366	675	161	-----	1,120
New Hampshire.....	10,995	2,109	8,886	-----	2,057	2,470	1,964	1,500	895
New Jersey.....	67,744	9,270	58,474	11,982	14,097	10,911	772	20,001	701
New Mexico.....	9,643	1,025	8,618	197	541	2,737	142	3,437	1,564
New York.....	145,153	75,064	69,494	6,709	28,281	21,357	9,549	-----	3,618
North Carolina.....	29,347	8,561	20,786	-----	7,026	12,895	154	-----	711
North Dakota.....	4,195	359	3,836	-----	978	1,260	390	-----	1,208
Ohio.....	49,764	8,976	40,788	-----	6,745	23,064	6,479	-----	4,500
Oklahoma.....	21,001	2,264	18,737	209	2,917	8,752	2,376	-----	4,463
Oregon.....	17,025	1,267	15,758	-----	6,226	6,102	331	1,532	1,665
Pennsylvania.....	103,895	29,117	74,778	-----	33,828	28,820	6,405	-----	5,725
Rhode Island.....	4,493	1,573	2,920	322	1,698	702	62	-----	136
South Carolina.....	33,662	7,032	31,630	-----	2,657	6,494	1,512	20,475	472
South Dakota.....	9,078	3,326	5,752	73	1,557	2,810	94	-----	1,215
Tennessee.....	78,959	23,745	55,214	656	4,533	10,016	1,913	36,631	1,460
Texas.....	52,290	10,149	42,150	-----	4,626	21,181	10,412	-----	5,931
Utah.....	5,263	425	4,838	-----	395	2,439	1,083	-----	921
Vermont.....	8,811	1,077	7,734	822	2,439	1,875	1,821	441	333
Virginia.....	21,862	3,753	18,104	2,550	6,091	7,724	641	-----	1,091
Washington.....	15,806	-----	15,806	-----	8,000	6,456	93	-----	1,264
West Virginia.....	32,126	5,918	26,208	-----	4,730	5,441	-----	15,000	1,037
Wisconsin.....	33,919	7,178	26,741	7	12,038	7,191	4,446	-----	3,059
Wyoming.....	3,953	470	3,483	94	682	1,085	605	-----	1,017
Total.....	1,423,164	286,491	1,136,673	43,318	289,802	411,109	77,693	222,288	92,463

Bureau of Public Roads.

\* Includes taxes held by court, from 1927 \$9,310,565, and 1929 \$11,659,778.

\* Includes loan by counties of their share of gasoline tax, \$1,600,000.

\* Issued by counties for State primary roads.

TABLE 503.—Total State highway road and bridge disbursements, 1930, as reported by State authorities

State	Grand total disbursements	Expenditures for State highway purposes						Other disbursements by State highway departments		
		Total expenditure for State highways	Construction and right of way	Maintenance	Miscellaneous expenses	Equipment, material, etc.	Interest on bonds	Retirement of bonds	County funds transfers	Other obligations assumed
	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars
Alabama.....	15,373	13,902	9,383	1,610	2	595	2,312	1,445		28
Arizona.....	5,233	5,050	3,426	1,466		138				183
Arkansas.....	39,821	29,963	24,630	2,954		239	2,140	7,423	1,797	638
California.....	37,741	35,966	26,211	6,888		46	2,821	1,775		
Colorado.....	8,144	7,384	5,201	1,682		266	265	780		
Connecticut.....	15,288	14,351	11,261	2,856		234				837
Delaware.....	6,498	2,311	1,536	231		52	192	5,685		497
Florida.....	9,838	9,804	8,056	1,610		136				54
Georgia.....	12,699	12,699	9,294	2,012	22	1,344	37			
Idaho.....	6,637	6,197	4,359	1,370		314	154	159		281
Illinois.....	48,854	38,351	28,808	3,240	40	288	5,975	2,000	6,525	1,978
Indiana.....	22,569	22,556	17,213	4,646		697				13
Iowa.....	50,608	48,369	42,358	3,312			2,699	1,090		1,149
Kansas.....	16,845	13,224	8,917	2,989	90	1,228			3,500	121
Kentucky.....	19,497	19,458	14,468	3,978	2	981	29		15	24
Louisiana.....	29,357	28,717	22,976	4,067		240	1,434	340		300
Maine.....	17,184	14,743	10,004	3,126	47	806	780	631		1,810
Maryland.....	17,992	14,442	10,943	2,187	78	417	852	1,871		1,679
Massachusetts.....	21,926	14,928	11,554	3,076		207	91	684	3,639	2,725
Michigan.....	46,136	33,910	24,612	6,554	241	254	2,249	1,333	10,339	54
Minnesota.....	39,365	24,318	17,651	4,764		613	1,290	12,065	2,982	
Mississippi.....	4,588	4,567	1,998	2,360	2	207				20
Missouri.....	43,921	42,090	34,681	4,725		112	2,572	1,000		831
Montana.....	6,378	6,378	5,354	778		246				
Nebraska.....	11,087	11,015	7,631	3,384						72
Nevada.....	2,710	2,497	1,875	515		87	20	150	34	29
New Hampshire.....	9,640	9,063	2,917	5,927		76	143	400	89	88
New Jersey.....	47,414	37,040	31,035	2,308		32	3,665	3,947	6,427	
New Mexico.....	9,138	8,577	6,029	1,750		295	503	581		
New York.....	73,283	67,082	51,024	9,671	9	1,838	4,540	600	5,551	
North Carolina.....	28,613	19,028	9,148	4,959	144		4,777	2,600	3,516	469
North Dakota.....	3,822	3,892	2,887	1,195		210				
Ohio.....	47,491	42,012	25,997	16,015					5,479	
Oklahoma.....	20,228	20,204	15,736	3,946		522				24
Oregon.....	14,668	11,794	7,881	2,493			1,420	1,925		949
Pennsylvania.....	95,590	85,141	51,561	24,535	838	4,256	3,965	2,837	3,889	3,628
Rhode Island.....	3,267	2,840	1,614	905		197	124	385		142
South Carolina.....	22,753	17,656	14,612	2,069	39	636	300		4,832	285
South Dakota.....	5,915	5,915	3,617	2,276	12	10				
Tennessee.....	53,278	39,108	29,915	5,060	1	2,329	1,803	12,488		1,682
Texas.....	47,332	46,596	32,950	12,159	351	1,136				736
Utah.....	5,193	4,706	2,753	1,289	11	313	335	438		49
Vermont.....	9,012	8,612	6,286	1,750		306	270	400		
Virginia.....	19,189	17,745	11,735	5,511	291		158	1,000		444
Washington.....	15,806	12,175	9,442	2,630		103			3,631	
West Virginia.....	23,308	20,265	13,759	3,621		205	2,680	2,583		210
Wisconsin.....	25,623	19,806	15,528	4,263	12	3			4,632	1,185
Wyoming.....	3,590	3,471	2,249	1,064		63	95	110		9
Total.....	1,139,677	979,998	713,117	191,684	2,227	22,302	50,668	69,505	66,898	23,276

Bureau of Public Roads.

TABLE 504.—*Mileage of county and local roads at end of 1930, from records and reports of local authorities*

State	Total mile- age local roads	Earth non- sur- faced	Surfaced roads by types								Brick and block
			Total surfaced mile- age	Sand- clay top- soil	Gravel- chert, etc.	Water- bound mac- adam (treated and un- treated)	Bitu- mi- nous mac- adam	Bitu- mi- nous con- crete (in- cludes sheet as- phalt)	Port- land con- crete		
	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	
Alabama.....	62,381	46,186	16,196	8,093	7,523	292	79	86	117	6	
Arizona.....	20,185	18,209	1,976	383	1,203	26	14	73	277	-----	
Arkansas.....	60,039	58,021	2,018	210	1,749	46	7	1	6	-----	
California.....	70,375	49,210	21,165	3,213	11,725	2,057	3,677	1,297	2,409	-----	
Colorado.....	59,740	56,527	3,213	1,381	1,826	-----	-----	-----	6	-----	
Connecticut.....	12,022	10,449	1,573	-----	985	396	91	8	91	2	
Delaware.....	2,962	2,521	441	-----	161	226	18	31	4	1	
Florida.....	23,703	12,102	11,601	3,954	992	5,312	108	694	57	514	
Georgia.....	95,160	84,154	11,006	9,143	1,291	75	264	31	200	2	
Idaho.....	35,260	28,253	7,007	2,054	4,895	-----	46	8	4	-----	
Illinois.....	87,398	72,286	15,112	-----	12,798	429	86	23	1,658	118	
Indiana.....	67,657	21,609	46,048	-----	42,966	1,126	322	188	1,300	146	
Iowa.....	95,643	82,091	13,552	-----	13,544	-----	-----	-----	8	-----	
Kansas.....	123,550	120,763	2,787	500	2,100	69	42	13	61	2	
Kentucky.....	46,261	36,761	9,500	165	3,101	6,132	71	7	24	-----	
Louisiana.....	25,044	20,390	4,654	60	4,570	11	5	7	1	-----	
Maine.....	18,843	14,502	4,341	8	4,295	13	18	-----	6	1	
Maryland.....	11,594	8,539	3,055	-----	1,610	1,115	20	1	309	-----	
Massachusetts.....	17,178	9,120	8,058	17	5,355	736	1,425	414	93	18	
Michigan.....	72,997	54,273	18,724	84	15,256	1,398	217	194	1,567	8	
Minnesota.....	103,770	73,347	30,423	5,927	24,284	101	2	29	130	-----	
Mississippi.....	55,856	43,243	12,613	204	12,155	18	57	78	95	6	
Missouri.....	102,094	93,406	8,688	1,200	5,543	1,450	175	53	267	-----	
Montana.....	58,924	56,900	2,024	120	1,900	2	2	-----	-----	-----	
Nebraska.....	84,153	82,553	1,602	500	1,045	5	3	13	33	8	
Nevada.....	19,802	19,069	703	38	652	-----	11	-----	2	-----	
New Hampshire.....	9,486	8,360	1,126	24	532	24	13	2	1	-----	
New Jersey.....	16,520	7,919	7,601	162	3,834	1,155	661	926	811	52	
New Mexico.....	88,442	33,099	55,343	78	265	-----	-----	-----	-----	-----	
New York.....	68,360	45,326	23,034	-----	10,599	4,147	6,890	71	1,303	24	
North Carolina.....	45,091	30,865	14,226	12,595	850	175	137	231	204	34	
North Dakota.....	99,445	98,802	643	-----	843	-----	-----	-----	-----	-----	
Ohio.....	73,763	34,181	39,582	-----	30,687	5,116	2,682	114	739	245	
Oklahoma.....	114,484	112,518	1,966	169	1,674	2	11	14	96	-----	
Oregon.....	47,265	36,388	10,327	350	8,270	1,200	-----	350	157	-----	
Pennsylvania.....	77,866	59,780	17,586	-----	12,491	2,487	601	696	834	477	
Rhode Island.....	1,730	1,209	521	-----	278	124	102	13	3	1	
South Carolina.....	51,733	37,797	13,936	13,197	572	7	10	52	96	8	
South Dakota.....	114,295	111,183	3,112	-----	3,112	-----	-----	-----	-----	-----	
Tennessee.....	60,909	43,851	17,058	236	8,286	2,924	558	-----	44	-----	
Texas.....	169,836	154,220	15,616	2,584	12,300	467	40	46	179	-----	
Utah.....	20,219	17,672	2,547	15	2,432	-----	5	45	50	-----	
Vermont.....	10,827	9,304	1,523	144	1,375	-----	1	3	-----	-----	
Virginia.....	52,269	45,290	6,979	3,849	1,712	1,820	83	-----	15	-----	
Washington.....	40,633	26,610	14,023	975	10,275	1,704	44	124	763	138	
West Virginia.....	30,635	23,430	2,205	-----	655	690	461	83	255	61	
Wisconsin.....	71,563	51,296	20,267	3,391	15,542	951	-----	-----	383	-----	
Wyoming.....	38,106	37,769	337	97	240	-----	-----	-----	-----	-----	
Total.....	2,684,570	2,217,232	467,338	71,907	310,308	43,527	19,059	6,019	14,656	1,862	
Total—1929.....	2,710,097	2,255,986	454,111	75,547	292,463	43,760	16,692	5,596	13,254	1,799	
1928.....	2,709,539	2,276,840	432,999	74,562	277,797	46,454	14,953	5,235	12,317	1,681	
1927.....	2,720,231	2,308,076	412,155	71,770	263,088	45,500	13,525	5,134	11,438	1,700	
1926.....	2,712,262	2,325,257	387,005	69,711	245,524	42,732	11,651	5,155	10,405	1,827	
1925.....	2,731,172	2,354,766	376,406	58,211	224,036	65,604	10,490	5,341	10,108	2,059	
1924.....	2,743,195	2,403,637	339,558	63,638	193,465	60,139	7,853	4,480	8,363	1,624	
1923.....	2,744,118	2,418,175	327,941	52,425	186,314	59,200	6,960	4,219	7,289	1,569	
1921.....	2,732,052	2,429,150	302,902	54,717	163,441	60,367	3,515	3,739	6,497	1,331	

Bureau of Public Roads.

1 Includes 559 miles of miscellaneous types.

2 Includes 9,996 miles of miscellaneous types.

3 Includes 9,975 miles of miscellaneous types.

4 Includes 10,265 miles of miscellaneous types.

TABLE 505.—Income and funds available for local roads, 1930, compiled from records of local authorities

State	Total funds available	Balance at first of year	Total income for local roads	Local road bond sales	Local road taxes and appropriation	Motor-vehicle fees	Gasoline-tax receipts	Funds from State for local roads	Miscellaneous income
	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars
Alabama	13,026	1,305	11,721	2,084	5,636	73	3,374	—	554
Arizona	2,805	142	2,663	390	920	44	1,034	93	182
Arkansas	9,900	347	9,553	—	2,100	1,027	6,368	—	58
California	49,181	15,060	34,121	881	17,721	8,553	10,451	394	1,121
Colorado	6,316	434	5,882	23	3,001	627	1,587	315	329
Connecticut	3,897	85	3,812	—	3,812	—	—	—	—
Delaware	2,048	272	1,776	—	1,119	—	—	610	47
Florida	32,656	12,419	20,237	531	8,885	1,215	7,011	—	2,625
Georgia	14,886	1,739	13,147	—	9,635	—	2,145	—	1,367
Idaho	9,459	2,392	7,067	—	3,672	1,668	—	241	342
Illinois	40,129	—	40,129	1,044	1,350	19,600	17,304	1,775	100
Indiana	47,519	10,256	37,263	8,110	24,900	—	4,250	—	3
Iowa	26,884	2,615	26,269	313	18,742	208	4,059	899	2,048
Kansas	22,895	3,800	19,395	1,639	13,051	1,750	1,750	—	1,205
Kentucky	8,813	—	8,813	2,000	6,000	563	—	—	250
Louisiana	12,950	3,038	9,912	500	9,280	—	—	—	162
Maine	3,170	—	3,204	40	3,084	—	—	—	100
Maryland	6,021	—	6,064	2,072	3,823	—	—	—	169
Massachusetts	14,560	167	14,393	400	10,394	—	—	8,336	413
Michigan	58,266	12,070	46,216	7,100	25,500	6,000	4,624	1,542	1,450
Minnesota	27,004	1,201	25,803	1,045	17,846	—	3,453	1,899	1,590
Mississippi	36,025	12,589	23,436	1,697	13,993	2,837	4,075	—	934
Missouri	20,120	1,800	18,320	7,700	9,600	—	—	—	1,520
Montana	5,022	325	4,697	100	2,820	1,527	—	50	200
Nebraska	12,920	1,860	11,060	25	6,280	2,532	2,263	—	400
Nevada	1,224	471	753	75	634	16	—	18	10
New Hampshire	3,674	—	3,674	—	3,582	—	—	89	3
New Jersey	28,584	394	28,190	3,796	17,827	5,950	—	477	140
New Mexico	501	69	432	—	231	201	—	—	—
New York	55,497	4,596	50,901	—	33,567	6,068	5,695	5,551	—
North Carolina	9,750	2,706	7,074	448	5,862	—	—	283	481
North Dakota	5,549	1,845	3,704	—	2,276	783	645	—	—
Ohio	87,701	9,718	77,983	29,001	41,157	1,794	5,719	—	812
Oklahoma	18,000	1,862	16,138	800	8,010	3,922	2,887	—	519
Oregon	10,390	915	9,475	1,250	5,300	1,010	—	1,215	700
Pennsylvania	89,308	18,409	70,899	5,420	47,570	—	4,644	7,517	5,748
Rhode Island	1,225	15	1,210	105	1,094	—	—	—	11
South Carolina	13,262	3,993	9,269	272	3,487	—	1,414	—	4,096
South Dakota	6,895	—	6,895	282	5,208	1,405	—	—	—
Tennessee	22,355	6,588	15,767	3,245	7,811	254	1,963	—	2,494
Texas	43,000	10,862	32,138	4,000	19,050	8,964	—	—	124
Utah	2,297	356	1,941	193	1,604	—	—	—	144
Vermont	1,000	—	1,000	—	700	—	—	300	—
Virginia	9,590	1,520	8,070	212	4,437	—	3,032	—	389
Washington	12,526	1,480	11,046	100	6,800	830	2,416	400	500
West Virginia	14,218	3,038	11,180	1,072	10,108	—	—	—	5
Wisconsin	47,529	4,055	43,474	5,370	25,499	—	4,648	6,551	406
Wyoming	1,206	2	1,204	—	740	—	300	77	87
Total	973,793	155,413	818,380	94,635	494,633	54,911	107,111	33,702	33,338

Bureau of Public Roads.

TABLE 506.—Disbursements for local roads, 1930, compiled from records of local authorities

State	Total disbursements	Expenditures for local road purposes					Other disbursements by local authorities	
		Total expenditures for local roads	Construction	Maintenance	Miscellaneous and overhead <sup>1</sup>	Interest on bonds	Principal payments on bonds	Funds transferred to State
	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars
Alabama.....	12,094	10,957	3,204	6,105	10	1,688	763	374
Arizona.....	2,741	2,477	500	1,467	201	219	284	-----
Arkansas.....	9,140	4,440	1,700	-----	40	2,700	4,700	-----
California.....	34,470	31,276	10,153	14,130	4,082	2,911	2,085	109
Colorado.....	5,981	5,918	1,385	4,002	515	16	20	43
Connecticut.....	3,812	3,600	549	2,991	28	34	212	-----
Delaware.....	1,854	1,607	619	609	16	303	247	-----
Florida.....	21,281	17,257	2,507	5,774	1,761	7,215	2,232	1,792
Georgia.....	12,962	11,174	1,967	6,718	601	1,888	1,607	181
Idaho.....	7,030	5,212	1,557	1,947	1,478	830	1,446	372
Illinois.....	34,323	33,035	14,000	16,500	985	1,600	1,300	-----
Indiana.....	38,133	23,899	10,450	12,140	715	3,594	10,550	600
Iowa.....	26,018	24,440	9,174	12,975	1,601	790	1,578	-----
Kansas.....	21,045	19,321	11,100	5,027	2,260	934	1,300	421
Kentucky.....	8,256	6,175	1,073	3,250	600	1,250	650	1,431
Louisiana.....	9,650	6,850	1,200	3,300	400	1,950	2,800	-----
Maine.....	3,170	3,110	200	2,750	100	60	60	-----
Maryland.....	5,894	5,450	3,003	1,853	46	543	444	-----
Massachusetts.....	14,034	12,340	5,242	6,403	558	137	564	1,150
Michigan.....	48,610	41,425	20,400	15,600	2,425	3,000	6,310	875
Minnesota.....	25,982	24,143	15,542	5,341	2,458	802	1,149	690
Mississippi.....	25,808	22,010	5,494	13,562	229	2,725	3,262	590
Missouri.....	18,870	18,370	10,705	4,820	2,025	820	500	-----
Montana.....	4,950	4,200	1,200	2,200	300	500	700	50
Nebraska.....	11,240	11,067	5,893	4,280	675	219	70	103
Nevada.....	876	715	160	454	52	49	90	71
New Hampshire.....	3,674	2,092	250	1,492	350	-----	1,562	-----
New Jersey.....	28,289	24,291	10,749	7,075	1,634	4,833	3,998	-----
New Mexico.....	484	484	-----	467	17	-----	-----	-----
New York.....	55,000	54,800	23,880	22,204	294	3,422	200	-----
North Carolina.....	14,143	11,819	2,429	3,866	274	5,250	2,324	-----
North Dakota.....	3,936	3,600	2,555	780	250	15	200	136
Ohio.....	79,939	48,965	25,717	15,304	2,280	5,604	30,974	-----
Oklahoma.....	16,897	11,352	2,600	6,700	452	1,600	3,208	2,337
Oregon.....	10,180	9,180	6,000	2,000	380	800	1,000	-----
Pennsylvania.....	76,724	60,606	31,635	19,779	2,874	6,428	5,269	7,819
Rhode Island.....	1,217	1,139	305	438	354	42	78	-----
South Carolina.....	12,142	8,395	2,130	3,989	2	2,274	3,605	142
South Dakota.....	6,486	6,486	3,102	2,874	487	10	-----	-----
Tennessee.....	15,702	14,564	3,813	6,964	689	3,198	559	879
Texas.....	39,500	22,762	6,500	9,750	162	6,350	7,000	10,038
Utah.....	1,463	1,607	587	757	98	215	291	60
Vermont.....	1,000	593	188	400	-----	5	7	400
Virginia.....	8,915	7,963	-----	7,047	-----	919	949	-----
Washington.....	11,260	10,510	3,400	3,900	510	700	750	-----
West Virginia.....	11,255	11,041	5,029	3,957	-----	2,055	214	-----
Wisconsin.....	43,179	33,612	19,571	10,154	1,890	1,997	3,023	6,541
Wyoming.....	1,168	1,163	223	834	71	85	25	-----
Total.....	851,687	700,495	296,531	284,229	37,067	82,605	112,577	38,615

Bureau of Public Roads.

<sup>1</sup> Administration and engineering included.

TABLE 507.—Motor vehicle registration 1930, as reported by State authorities

State	Registered motor vehicles (private and commercial)			Registered motor cycles	Tax- exempt motor vehicles	Number of licenses and permits		Year's increase in registration	
	All motor cars and trucks	Passenger autos, taxi and busses	Motor trucks and road tractors			Dealers' licenses	Opera- tors' and chautau- eurs' per- mits	Number	Per cent
Alabama.....	277, 146	239, 170	37, 976	663	1, 368	4, 181	2, 989	-8, 387	-2.9
Arizona.....	110, 525	98, 480	12, 045	390	1, 467	117	13, 468	1, 512	1.4
Arkansas.....	220, 204	193, 218	26, 986	380	939	481	5, 137	-12, 924	-5.5
California.....	2, 041, 856	1, 810, 969	230, 887	9, 405	18, 122	3, 325	7, 296	67, 015	3.4
Colorado.....	308, 509	276, 847	31, 662	1, 059	283	3, 474	2, 296	5, 020	1.7
Connecticut.....	331, 026	279, 830	51, 196	2, 371	2, 390	3, 178	409, 557	2, 963	0.9
Delaware.....	56, 109	45, 533	10, 576	295	44	680	63, 452	1, 149	2.1
District of Columbia.....	156, 876	139, 733	16, 943	903	3, 412	1, 759	71, 743	5, 226	3.4
Florida.....	327, 801	274, 705	53, 096	1, 490	3, 571	1, 724	2, 514	-18, 176	-5.2
Georgia.....	341, 580	294, 461	47, 119	1, 178	934	2, 796	3, 045	-17, 325	-4.8
Idaho.....	119, 077	104, 526	14, 551	359	1, 329	441	923	1, 003	0.8
Illinois.....	1, 638, 260	1, 430, 676	207, 584	6, 245	979	4, 368	108, 538	23, 172	1.4
Indiana.....	875, 763	747, 366	128, 397	2, 832	8, 593	2, 706	58, 847	9, 048	1.0
Iowa.....	778, 386	706, 196	72, 190	1, 712	3, 789	2, 340	17, 911	-6, 064	-0.8
Kansas.....	594, 523	511, 384	83, 139	1, 275	2, 833	2, 607	1, 082	13, 300	2.3
Kentucky.....	331, 002	295, 161	35, 841	681	2, 282	1, 082	12, 481	-1, 846	-0.6
Louisiana.....	275, 283	230, 586	44, 697	518	209	407	22, 735	-5, 538	-2.0
Maine.....	186, 157	148, 722	37, 435	1, 170	1, 629	1, 239	227, 723	1, 651	0.9
Maryland.....	321, 702	283, 870	37, 832	1, 941	2, 000	5, 788	82, 468	1, 829	0.6
Massachusetts.....	846, 206	743, 288	102, 918	4, 642	1, 556	8, 112	982, 795	23, 502	3.5
Michigan.....	1, 328, 209	1, 161, 051	167, 158	8, 530	3, 871	2, 034	70, 710	-66, 838	-4.8
Minnesota.....	732, 972	624, 902	108, 070	1, 825	3, 680	1, 991	2, 873	2, 873	0.4
Mississippi.....	237, 094	203, 443	33, 651	217	74	4, 942	12, 917	-12, 917	-5.2
Missouri.....	761, 600	670, 145	91, 455	1, 746	2, 086	2, 438	36, 221	4, 920	0.7
Montana.....	135, 168	109, 549	25, 619	242	1, 640	575	412	-5, 219	-3.7
Nebraska.....	426, 229	367, 557	58, 642	900	1, 681	3, 251	8, 003	8, 003	1.9
Nevada.....	29, 645	23, 388	6, 257	74	544	109	2, 270	-2, 270	-7.1
New Hampshire.....	112, 133	93, 155	19, 028	1, 132	494	600	130, 023	3, 303	3.0
New Jersey.....	852, 850	719, 096	133, 154	5, 998	8, 420	3, 207	1, 018, 336	20, 518	2.5
New Mexico.....	84, 130	70, 450	13, 700	200	958	230	6, 778	6, 778	7.4
New York.....	2, 307, 730	1, 966, 981	340, 749	12, 355	20, 886	4, 965	2, 900, 198	44, 471	2.0
North Carolina.....	453, 241	397, 133	56, 108	1, 350	8, 070	5, 575	30, 361	-30, 361	-6.3
North Dakota.....	183, 019	155, 383	27, 636	235	8	650	5, 027	-5, 027	-2.7
Ohio.....	1, 759, 363	1, 555, 063	204, 270	6, 886	13, 854	3, 772	60, 925	-7, 251	-0.4
Oklahoma.....	550, 331	490, 947	59, 384	1, 228	5, 230	517	26, 705	-20, 490	-3.6
Oregon.....	252, 128	234, 766	17, 357	1, 348	3, 003	517	26, 705	-16, 884	-6.3
Pennsylvania.....	1, 763, 521	1, 534, 834	218, 687	12, 961	2, 478	10, 704	2, 181, 006	20, 238	1.2
Rhode Island.....	136, 423	116, 792	19, 631	770	901	333	156, 532	2, 414	1.8
South Carolina.....	218, 402	192, 141	26, 261	550	3, 550	1, 259	814, 702	-12, 872	-5.6
South Dakota.....	205, 172	180, 195	24, 977	239	997	894	973	973	0.5
Tennessee.....	338, 259	330, 436	37, 823	1, 228	4, 552	625	5, 828	5, 828	1.6
Texas.....	1, 385, 896	1, 159, 139	206, 757	4, 045	2, 505	3, 879	18, 804	17, 789	1.3
Utah.....	113, 997	96, 128	17, 869	488	1, 373	200	2, 650	1, 336	1.2
Vermont.....	86, 624	78, 398	8, 226	524	28	363	97, 699	-6, 406	-6.9
Virginia.....	375, 889	318, 532	57, 307	2, 084	5, 053	4, 063	9, 962	-11, 316	-2.9
Washington.....	446, 062	382, 874	63, 188	1, 993	6, 449	4, 738	85, 714	3, 721	0.8
West Virginia.....	266, 273	225, 900	40, 373	1, 330	3, 057	10, 702	87, 606	-2, 615	-1.0
Wisconsin.....	782, 562	677, 452	105, 110	2, 668	5, 225	2, 912	79, 059	-10, 940	-1.4
Wyoming.....	61, 501	51, 579	9, 922	121	591	382	821	821	1.4
Total.....	26, 523, 779	23, 042, 840	3, 480, 939	107, 811	173, 619	121, 788	9, 370, 885	22, 336	0.08

Bureau of Public Roads.

1 Includes 7,859 United States Government-owned cars at large not allocated to states.

TABLE 508.—*Motor-vehicle revenues, 1930, as reported by State authorities*

State	Gross receipts	Motor-car registration receipts			Miscellaneous receipts	Disposition of gross receipts <sup>1</sup>			
		All motor cars	Passenger cars and busses	Trucks, etc.		Collection costs	State highways	Local roads	On road bonds and miscellaneous
	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars
Alabama.....	3,800					226	890	741	1,943
Arizona.....	735	540	313	227	195		735		
Arkansas.....	4,284	4,243			41	69	2,875		1,340
California.....	9,859	8,630	6,202	2,437	1,220	1,493	3,358	3,338	1,590
Colorado.....	1,901	1,785	1,416	363	116	131	8 5	885	
Connecticut.....	8,290	6,354	4,878	1,476	1,936	716	7,574		
Delaware.....	1,110	804	630	228	246		598		512
District of Columbia.....	636	179	152	27	457	103			533
Florida.....	4,814	4,729	3,546	1,183	85	289	3,394	1,131	
Georgia.....	4,482	4,418	3,606	812	64	211	4,271		
Idaho.....	1,998	1,959	1,549	410	39	60	194	1,744	
Illinois.....	18,444	17,292	12,858	4,434	1,152		10,468		7,976
Indiana.....	6,347	5,942	4,533	1,409	405	327	6,020		
Iowa.....	12,694	11,978	10,261	1,727	716	613	11,956		125
Kansas.....	6,084					171	4,163	1,760	
Kentucky.....	5,647	5,376	4,205	1,171	171	275	4,686	586	
Louisiana.....	4,609	4,528			81	50	4,550		
Maine.....	3,167	2,423	1,815	608	744	317	1,443		1,407
Maryland.....	8,438	2,713	2,303	410	725	344	2,475		619
Massachusetts.....	7,121	4,118	2,884	1,234	3,003	1,044	4,841		636
Michigan.....	22,482	20,772	15,999	4,773	1,710	875	14,525	6,000	1,082
Minnesota.....	11,062	10,926	8,937	1,989	136		0,977		4,085
Mississippi.....	8,046					180	241	2,645	
Missouri.....	10,150					499	6,079		3,372
Montana.....	1,583	1,503	1,209	294	80	56		1,527	
Nebraska.....	3,895	3,631	3,117	514	174	117	1,106	2,582	
Nevada.....	874	287	206	81	87	14	190		170
New Hampshire.....	2,290	1,868			422	175	2,115		
New Jersey.....	15,382	11,270	7,241	4,029	4,112	1,084	9,362	4,735	251
New Mexico.....	1,280					78	445	204	553
New York.....	40,858	36,460	26,546	9,914	4,398	2,653	28,261	6,088	3,846
North Carolina.....	6,536					300	2,848		3,088
North Dakota.....	1,959	1,946	1,513	428	13	77	1,099	783	
Ohio.....	13,287	12,700			587	507	6,383	6,397	
Oklahoma.....	6,536					256	2,358	3,922	
Oregon.....	9,618	9,060	7,512	1,548	558	555	2,296	5,316	3,451
Pennsylvania.....	33,112	23,860	16,109	7,751	9,252	2,043	26,514		4,550
Rhode Island.....	2,281	1,834	1,350	494	447	250	2,014	17	
South Carolina.....	2,878	2,581	2,130	451	297	41	2,681		156
South Dakota.....	2,960	2,901	2,463	438	59	92	1,403	1,405	
Tennessee.....	4,767					89	2,221	2,220	237
Texas.....	13,961	13,061	9,252	3,809	900	844	4,153	8,964	
Utah.....	856					118	402		336
Vermont.....	2,392	2,058	1,680	378	334		2,392		
Virginia.....	6,494	6,235	5,109	1,126	259	212	6,116		166
Washington.....	7,617	7,354	5,745	1,609	263	188	5,279	2,002	88
West Virginia.....	4,703	4,296	3,332	964	407	210	1,622		2,871
Wisconsin.....	13,084	12,724	9,123	3,601	360	700	6,986	5,486	
Wyoming.....	692						692		
Total.....	355,705					19,197	222,147	68,578	45,783

Bureau of Public Roads.

<sup>1</sup> These figures do not always agree with those shown on highway income tables, because of time of disposition and use of fiscal years.

TABLE 509.—Gasoline taxes, 1930, as reported by State authorities

State	Total tax (re-funds deducted)	Disposition of total taxes collected					Gallons consumed by motor vehicles	Tax rate per gallon
		Collection costs	Construction, etc.		State and county road-bond payments	Miscellaneous		
			State highways <sup>1</sup>	Local roads <sup>1</sup>				
	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 dollars	1,000 gallons	Cents
Alabama	6,902	34	1,959	3,440	1,469		172,537	4
Arizona	2,670		1,683	987			66,760	4
Arkansas	6,427	48	4,505		1,803	71	128,545	5
California	34,870	52	23,212	11,606			1,162,338	3
Colorado	6,145	55	4,263	1,644		183	153,621	4
Connecticut	4,515		4,515				223,297	2
Delaware	1,013		864		149		33,779	3
District of Columbia	1,600					1,600	79,984	2
Florida	13,655	13	4,541	757	4,540	3,804	227,037	6
Georgia	13,435	4	8,954	2,239		2,238	223,185	6
Idaho	2,731	13	2,674		36	8	54,423	5
Illinois	27,472	61	18,274	9,137			915,747	3
Indiana	17,159	41	12,838	3,210		1,070	428,969	4
Iowa	10,584	32	5,243	5,309			352,502	3
Kansas	9,121		7,371	1,750			301,016	3
Kentucky	8,415	28	8,387				168,295	5
Louisiana	7,546		5,543		1,848	155	184,782	5
Maine	4,169	29	2,070	2,070			102,737	4
Maryland	6,991	9	5,526			1,456	174,780	4
Massachusetts	10,563	20	7,407	2,500	636		528,147	2
Michigan	21,714	42	11,508	6,624	3,000	540	722,463	3
Minnesota	10,359		6,908	3,453			345,304	3
Mississippi	6,918	7	2,848	3,855		208	135,824	5
Missouri	8,650	57	8,582				431,958	2
Montana	2,942	13	2,929				58,898	5
Nebraska	9,060	7	6,790	2,268			226,511	4
Nevada	675		675				16,575	4
New Hampshire	2,499		1,874		625		62,457	4
New Jersey	11,380	19	11,268			93	546,685	3
New Mexico	2,762	55	1,843		864		54,366	5
New York	28,476		21,320	5,085		1,471	1,438,583	2
North Carolina	12,533		8,845		3,688		250,069	5
North Dakota	1,972	25	1,290	645		12	65,643	3
Ohio	37,081		23,176	7,416		6,459	927,036	4
Oklahoma	12,092	62	9,022	3,008			302,310	4
Oregon	6,199	15	6,184				154,986	4
Pennsylvania	33,624	279	25,251	4,644	3,450		928,842	3
Rhode Island	1,736		1,302		434		86,613	2
South Carolina	7,146		3,476	1,191	2,479		119,072	6
South Dakota	3,504	13	2,715		776		87,597	4
Tennessee	10,719	54	6,399	2,133	2,133		214,384	5
Texas	29,527		22,145			7,382	738,177	4
Utah	2,106	4	1,663		439		60,138	3½
Vermont	1,880		1,880				46,998	4
Virginia	10,775		7,543	3,232			216,501	5
Washington	7,253		4,835	2,418			241,775	3
West Virginia	5,367		2,687		2,680		133,966	4
Wisconsin	8,315	11	3,058	4,647		589	415,742	2
Wyoming	1,447		1,085	362			36,175	4
Total	494,683	1,102	338,928	96,225	31,049	27,379	14,751,309	2.35

Board of Public Roads.

<sup>1</sup> These figures do not always agree with those shown on highway income tables because of time of disposition and use of fiscal years.

TABLE 510.—*Annual average rate in cents per hour for common labor employed on Federal-aid highway projects, 1922-1931*

Year	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific	United States
	<i>Cents per hour</i>	<i>Cents per hour</i>	<i>Cents per hour</i>	<i>Cents per hour</i>	<i>Cents per hour</i>	<i>Cents per hour</i>	<i>Cents per hour</i>	<i>Cents per hour</i>	<i>Cents per hour</i>	<i>Cents per hour</i>
1922.....	40	37	33	32	21	20	24	38	49	33
1923.....	53	47	41	36	27	23	25	41	54	39
1924.....	49	43	40	36	28	24	27	40	53	38
1925.....	46	43	37	37	27	25	26	44	52	38
1926.....	49	47	38	36	29	25	27	44	52	38
1927.....	49	47	39	37	28	25	30	45	53	40
1928.....	49	48	39	38	26	26	28	46	52	41
1929.....	51	48	39	37	28	26	31	47	53	39
1930.....	50	42	38	37	25	24	28	47	53	39
1931.....	45	37	36	35	22	20	23	45	51	36

Bureau of Public Roads.

TABLE 511.—*Fertilizer and fertilizer materials: Production, sales, and value in the United States, calendar years 1928-1930*

Item	Quantity			Value		
	1928	1929	1930	1928	1929	1930
<b>Agricultural lime and liming materials sold: <sup>1</sup></b>						
Lime from limestone—	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Quicklime.....	110, 533	89, 654	843, 111	639, 615	448, 634	2, 372, 779
Hydrated.....	223, 377	248, 675		1, 647, 943	1, 989, 267	
Lime from oyster shells.....	15, 371	14, 000		126, 844	119, 000	
Limestone, pulverized.....	2, 186, 870	2, 654, 580		3, 153, 848	3, 764, 775	
Calcareous marl.....	61, 034	88, 990		200, 704	130, 866	
<b>Total.....</b>	<b>2, 597, 185</b>	<b>3, 045, 899</b>		<b>5, 768, 954</b>	<b>6, 402, 542</b>	
<b>Phosphate rock sold or used: <sup>2</sup></b>						
Florida—	<i>Long tons</i>	<i>Long tons</i>	<i>Long tons</i>			
Hard rock.....	95, 918	72, 424	81, 763	383, 672	267, 218	517, 229
Land pebble.....	2, 787, 528	3, 015, 874	3, 166, 318	9, 040, 350	9, 633, 856	10, 273, 076
<b>Total.....</b>	<b>2, 883, 446</b>	<b>3, 088, 298</b>	<b>3, 248, 071</b>	<b>9, 424, 022</b>	<b>9, 901, 074</b>	<b>10, 790, 305</b>
Tennessee—						
Brown and blue rock.....	577, 095	633, 939	611, 045	2, 856, 850	3, 097, 104	2, 938, 525
Other States.....	<sup>3</sup> 40, 865	<sup>4</sup> 38, 618	<sup>4</sup> 67, 276	<sup>3</sup> 162, 307	<sup>4</sup> 155, 081	<sup>3</sup> 268, 000
<b>Total phosphate rock.....</b>	<b>3, 501, 406</b>	<b>3, 760, 855</b>	<b>3, 926, 392</b>	<b>12, 443, 179</b>	<b>13, 153, 259</b>	<b>13, 996, 830</b>
Sulphur produced.....	1, 981, 873	2, 362, 389	2, 558, 981			
Sulphur sold <sup>1</sup> .....	2, 082, 924	2, 437, 238	1, 989, 917	<sup>3</sup> 37, 500, 000	<sup>4</sup> 43, 800, 000	<sup>3</sup> 35, 800, 000
Pyrites produced.....	312, 815	333, 465	347, 512	1, 081, 758	1, 250, 141	1, 028, 680

Bureau of Agricultural Economics. Compiled from annual reports of the Bureau of the Census. Figures for earlier years appear in previous issues of the Yearbook.

<sup>1</sup> Sold by producers.<sup>2</sup> Sold or used by producers.<sup>3</sup> Idaho and Wyoming.<sup>4</sup> Idaho, Wyoming, and Montana.<sup>5</sup> Approximate.

MISCELLANEOUS AGRICULTURAL STATISTICS

943

TABLE 512.—Fertilizer: Consumption in the United States by states, 1920-1931

State and division	Calendar year <sup>1</sup>										
	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons	1,000 short tons
Maine.....	168	151	172	168	182	185	147	181	179	186	196
New Hampshire <sup>2</sup> .....	17	14	15	17	16	16	15	17	17	17	17
Vermont.....	20	15	16	18	17	18	18	16	17	15	16
Massachusetts.....	61	61	66	64	62	63	59	72	71	62	67
Rhode Island <sup>3</sup> .....	10	8	8	9	9	9	8	10	10	10	10
Connecticut.....	75	70	70	70	70	70	70	65	72	69	69
New York.....	250	230	250	250	250	253	234	260	260	250	250
New Jersey.....	165	163	177	157	153	147	135	142	144	142	156
Pennsylvania.....	333	321	322	309	320	328	329	327	340	332	332
North Atlantic.....	1,099	1,033	1,096	1,062	1,079	1,089	1,015	1,093	1,110	1,083	1,113
Ohio.....	300	255	311	303	321	322	305	313	321	339	327
Indiana <sup>4</sup> .....	232	188	209	198	192	226	228	240	221	250	224
Illinois.....	15	12	14	17	17	25	25	26	31	38	41
Michigan.....	113	83	86	84	95	109	105	117	160	153	130
Wisconsin.....	12	13	14	15	15	12	18	23	33	41	51
Minnesota.....	5	4	6	7	8	9	11	11	14	13	15
Iowa.....	4	3	4	4	5	6	6	7	10	17	25
Missouri <sup>4</sup> .....	93	51	50	52	47	64	57	56	65	59	60
Kansas.....	13	4	4	5	5	4	8	8	9	10	8
Other States.....	1	1	1	1	1	1	1	1	1	2	3
North Central.....	788	614	699	686	706	778	762	802	855	922	852
Delaware.....	62	38	40	37	36	41	43	41	41	41	43
Maryland.....	172	140	156	155	151	165	163	165	173	165	177
Virginia <sup>5</sup> .....	465	370	450	422	442	452	435	408	438	430	449
West Virginia <sup>4</sup> .....	35	29	38	40	40	41	43	44	50	50	50
North Carolina <sup>4</sup> .....	1,170	691	951	1,066	1,183	1,218	1,218	1,171	1,249	1,294	1,242
South Carolina <sup>4</sup> .....	1,099	599	527	693	844	873	840	727	788	760	749
Georgia <sup>4</sup> .....	1,003	536	522	676	679	779	780	713	888	869	929
Florida <sup>4</sup> .....	262	291	354	398	365	359	399	417	469	427	487
South Atlantic.....	4,268	2,694	3,038	3,487	3,740	3,928	3,921	3,686	4,191	4,036	4,126
Kentucky.....	90	62	85	90	85	93	92	70	90	93	114
Tennessee <sup>4</sup> .....	98	64	90	106	115	142	156	112	151	143	164
Alabama <sup>4</sup> .....	375	168	264	448	457	598	615	478	681	675	644
Mississippi <sup>4</sup> .....	131	61	143	208	206	258	273	219	333	328	404
Arkansas <sup>4</sup> .....	78	22	36	80	97	123	126	75	126	157	158
Louisiana <sup>4</sup> .....	111	86	75	105	125	111	114	93	144	174	176
Oklahoma.....	4	2	2	4	4	5	6	4	8	9	7
Texas <sup>4</sup> .....	55	22	34	79	128	101	125	81	145	192	145
South Central.....	942	437	749	1,120	1,217	1,431	1,512	1,132	1,678	1,771	1,812
Washington.....	6	5	4	5	7	10	12	14	16	17	17
Oregon.....	6	6	8	8	8	8	8	9	10	10	10
California.....	66	73	75	72	66	86	94	103	121	130	142
Other States.....	2	1	1	2	2	3	4	4	4	6	8
Western.....	80	85	88	87	83	107	118	130	151	163	177
United States.....	7,177	4,863	5,670	6,442	6,825	7,333	7,328	6,843	7,985	7,975	8,110

Bureau of Agricultural Economics. Rearranged from latest revised report of the National Fertilizer Association, published in the Fertilizer Review May-June, 1931. Based on fertilizer tag sales or sale records or estimates, as shown in footnotes.

<sup>1</sup> Except as follows: New Hampshire, Massachusetts, Idaho, and Oklahoma (1920-1927), year ended June 30; Rhode Island, year ended Mar. 31; New Jersey, year ended October 31.

<sup>2</sup> Estimated by State authorities.

<sup>3</sup> Estimated.

<sup>4</sup> Preliminary.

<sup>5</sup> Based on tag sales.

<sup>6</sup> Totals of 4 companies plus estimates for others.

TABLE 513.—*Fertilizer and fertilizer materials: Production, consumption, imports, and exports, United States, 1926-1930*

Item	Calendar year				
	1926	1927	1928	1929	1930 <sup>1</sup>
<b>Sulphate of ammonia (equivalent of all forms):</b>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>
Production <sup>2</sup> .....	690, 976	717, 460	793, 887	856, 214	769, 022
Sales <sup>3</sup> .....	682, 967	741, 866	764, 355	827, 674	746, 031
Imports for consumption.....	9, 392	19, 211	42, 133	21, 338	39, 180
Exports.....	202, 860	155, 335	104, 177	162, 132	91, 461
Nitrate of soda, imports for consumption.....	1, 024, 009	838, 636	1, 156, 860	1, 042, 113	643, 881
<b>Sulphuric acid:</b>					
Production <sup>4</sup> .....	1, 745, 759	1, 656, 871	2, 126, 860	2, 262, 784	2, 228, 588
Imports for consumption.....	27, 960	17, 434	13, 164	8, 104	450
Exports.....	4, 612	3, 756	8, 500	8, 480	2, 735
Consumption <sup>5</sup> .....	2, 058, 683	2, 137, 129	2, 440, 121	2, 445, 581	2, 476, 712
<b>Superphosphate:</b>					
Production <sup>6</sup> .....	3, 799, 054	3, 699, 579	4, 472, 341	4, 294, 967	4, 530, 521
Sales <sup>7</sup> .....	3, 536, 552	1, 915, 913	1, 283, 732	1, 380, 565	1, 404, 041
<b>Potash:</b>					
Production, domestic.....	46, 324	76, 819	104, 129	107, 820	105, 810
Sales, domestic.....	51, 369	94, 722	105, 208	101, 370	98, 230
<b>Imports for consumption—</b>					
Kainit.....	203, 702	115, 345	119, 897	85, 042	125, 455
Manure salts <sup>8</sup> .....	354, 413	311, 357	453, 242	437, 727	405, 215
Muriate of potash.....	223, 049	183, 475	261, 644	258, 582	306, 047
Sulphate of potash.....	78, 258	77, 172	96, 833	89, 051	96, 603
Other potash-bearing substances <sup>9</sup> .....	52, 357	10, 531	12, 076	706	613
<b>Total imports for consumption.....</b>	<b>911, 779</b>	<b>697, 880</b>	<b>943, 662</b>	<b>871, 208</b>	<b>933, 938</b>

Bureau of Agricultural Economics. Compiled from Annual Reports of the Bureau of the Census, Bureau of Foreign and Domestic Commerce, and the Bureau of Mines.

<sup>1</sup> Subject to revision.

<sup>2</sup> By-product of coke ovens: Production from other sources (coal, gas, bone carbonizing, etc.) accounted for less than 5 per cent of the total production for these years.

<sup>3</sup> Fertilizer establishments only.

<sup>4</sup> Quantity sold as superphosphate or used in manufactured goods sold.

<sup>5</sup> Includes double manure salts and hard salts.

<sup>6</sup> Includes ashes (wood), beet root, other potash-bearing substances (alunite, leucite, etc.), used for fertilizer.

TABLE 514.—*Nitrogen: World production of, contained in inorganic nitrogenous materials, 1927-1931*

Product	Quantity produced during year ended May 31—				
	1927	1928	1929	1930	1931 <sup>1</sup>
<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>
By-product sulphate of ammonia.....	361, 000	404, 800	413, 600	460, 900	395, 500
Other by-product ammonia <sup>1</sup> .....	55, 300	59, 400	56, 100	56, 500	34, 000
Cyanamide.....	198, 000	224, 400	231, 000	260, 100	221, 000
Synthetic sulphate of ammonia.....	330, 000	403, 700	533, 500	486, 300	384, 000
Nitrate of lime.....	89, 100	115, 500	143, 600	143, 500	121, 600
Other synthetic nitrogen <sup>1</sup> .....	201, 700	259, 600	401, 500	470, 000	432, 500
Chilean nitrate of soda.....	219, 500	429, 000	539, 000	510, 000	275, 000
<b>Total.....</b>	<b>1, 454, 600</b>	<b>1, 896, 400</b>	<b>2, 324, 300</b>	<b>2, 423, 300</b>	<b>1, 863, 600</b>

Bureau of Chemistry and Soils. British Sulphate of Ammonia Federation (Ltd.), annual report. Fertilizers are included in this table under the final form as sold, so that, for example, cyanamide if converted into sulphate of ammonia is included under synthetic sulphate of ammonia, or, if into ammophos, is included under other synthetic nitrogen.

<sup>1</sup> Including ammonia products used for industrial purposes and ammonia in mixed fertilizers.

TABLE 515.—*Insecticides and fungicides: Production, imports for consumption and domestic exports, 1926-1930*

Item	1926	1927	1928	1929	1930
Arsenic, white:	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Production.....	15,406,890	35,815,999	22,806,972	41,093,066	20,942,663
Imports for consumption.....		25,033,649		26,814,042	
Calcium arsenate:					
Production.....	<sup>1</sup> 5,363,820	27,282,826		31,814,176	
Imports for consumption.....	1,057	3,807	1,823		6,359
Exports.....			1,178,702	3,139,633	3,177,335
Lead arsenate:					
Production.....	<sup>1</sup> 16,898,214	21,527,838		29,903,552	
Imports for consumption.....				200	800
Exports.....			1,093,673	1,563,982	2,270,980
Sulphate of copper: <sup>2</sup>					
Production.....	33,353,264	36,039,487	44,463,000	40,288,860	<sup>3</sup> 36,937,300
Imports for consumption.....	2,558,584	1,978,726	3,611,844	5,388,743	5,964,378
Exports.....	4,798,620	6,206,904	8,666,899	6,419,688	5,061,554
Tobacco extract, exports <sup>4</sup>		2,297,016	2,386,526	2,294,567	1,929,171
Sodium arsenate, imports for consumption	116,262	90,454	12,403		94,051
Prepared animal dips:					
Imports for consumption <sup>5</sup>	119,947	102,394	175,055	208,770	174,215
Exports.....				2,252,644	1,258,139

Bureau of Agricultural Economics. Compiled from reports of the Bureau of the Census, Bureau of Mines and Bureau of Foreign and Domestic Commerce.

<sup>1</sup> Year ended June 30. Not comparable with census years 1927, 1929, which cover more industries, therefore are more accurate.

<sup>2</sup> Copper industry only. The total production as reported by the census for 1927 and 1929 was: 56,666,812 pounds and 79,187,343 pounds, respectively.

<sup>3</sup> Estimated.

<sup>4</sup> Nicotine sulphate and "Other tobacco extracts."

<sup>5</sup> Classified as sheep dip.

TABLE 516.—*Insecticides and fungicides: Average wholesale price per pound New York, 1919-1931* <sup>1</sup>

Calendar year	Arsenic, white	Calcium arsenate	Lead arsenate		Paris green	Bordeaux mixture		Lime-sulphur solution, per gallon
			Powder	Paste		Powder	Paste	
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
1919.....	9.9	-----	29.9	14.9	35.8	16.5	12.4	19.1
1920.....	13.8	-----	26.8	13.3	36.2	19.3	13.2	18.8
1921.....	7.9	19.1	19.4	11.6	27.0	17.2	10.9	16.6
1922.....	8.9	13.7	14.8	11.1	22.6	16.8	10.8	16.5
1923.....	14.2	16.4	22.2	15.7	30.4	22.0	16.3	16.5
1924.....	9.4	10.6	20.9	13.1	28.8	16.3	12.5	16.5
1925.....	5.1	7.8	15.6	11.0	21.5	13.2	11.0	16.5
1926.....	3.8	8.0	14.6	11.0	18.4	11.5	11.0	14.7
1927.....	4.0	7.5	13.8	-----	19.2	11.5	11.0	15.5
1928.....	4.4	6.8	14.1	-----	27.0	11.3	10.9	15.5
1929.....	4.5	7.4	13.5	-----	30.9	11.3	10.7	15.2
1930.....	4.5	8.1	14.5	-----	35.2	13.0	13.0	15.2
1931.....	4.5	6.5	12.6	-----	32.5	12.8	12.8	15.2

Bureau of Agricultural Economics. Compiled from the Oil, Paint, and Drug Reporter.

<sup>1</sup> Average of monthly range.

TABLE 517.—Number of marketing and purchasing associations, estimated membership, and estimated amount of business, by geographic divisions and States, 1930-31

Geographic division and State	Cotton and cotton products			Dairy products			Forage			Fruits and vegetables			Grain			Livestock			Nuts		
	No.1 listed	Esti- mated mem- ber- ship (thou- sand)	Esti- mated busi- ness (thou- sand)	No.1 listed	Esti- mated mem- ber- ship (thou- sand)	Esti- mated busi- ness (thou- sand)	No.1 listed	Esti- mated mem- ber- ship (thou- sand)	Esti- mated busi- ness (thou- sand)	No.1 listed	Esti- mated mem- ber- ship (thou- sand)	Esti- mated busi- ness (thou- sand)	No.1 listed	Esti- mated mem- ber- ship (thou- sand)	Esti- mated busi- ness (thou- sand)	No.1 listed	Esti- mated mem- ber- ship (thou- sand)	Esti- mated busi- ness (thou- sand)	No.1 listed	Esti- mated mem- ber- ship (thou- sand)	Esti- mated busi- ness (thou- sand)
United States.....	261	190,000	\$130,000	2,391	725,000	\$929,000	8	1,000	\$1,200	1,386	192,000	\$319,000	3,448	775,000	\$921,000	2,014	400,000	\$300,000	71	17,000	\$13,000
New England.....				56	36,250	63,000				33	1,810	3,800	1	300	140	2	140	170			
Maine.....				3	370	400				17	470	750									
New Hampshire.....				2	180	400				1	30	30	1	300	140	1	40	10			
Vermont.....				35	6,820	11,160				1	40	10									
Massachusetts.....				10	24,750	38,200				13	1,230	3,000				1	100	100			
Rhode Island.....				2	24,170	640															
Connecticut.....				4	3,900	12,300				1	40	10									
Middle Atlantic.....				72	108,000	164,500				82	10,040	12,830	3	950	1,920	4	410	4,000			
New York.....				42	61,800	124,500				59	6,600	8,370	1	100	1,000	2	130	2,000			
New Jersey.....										10	2,330	2,550									
Pennsylvania.....				30	47,100	40,000				13	1,710	4,910	2	850	830	2	280	2,000			
East North Central.....				1,055	203,050	191,620				120	13,060	15,440	900	225,200	150,950	760	173,500	117,000			
Ohio.....				31	32,700	25,850				14	1,300	5,000	194	63,200	29,850	66	27,500	19,000			
Indiana.....				31	16,400	6,270				4	1,560	6,100	120	40,100	15,620	93	20,000	14,000			
Illinois.....				71	34,400	45,300				26	1,200	780	445	82,300	83,300	330	68,000	54,000			
Michigan.....				68	72,43,000	31,100				65	6,600	5,800	90	33,400	16,680	84	25,000	11,000			
Wisconsin.....				850	76,650	72,100				21	2,900	3,640	51	16,200	5,500	183	38,000	19,000			
West North Central.....				1,009	296,910	193,660				110	14,920	10,630	2,179	467,400	381,460	1,139	195,900	159,200			
Minnesota.....				649	114,500	82,800				25	4,250	2,890	316	74,000	45,150	355	63,500	50,000			
Iowa.....				297	68,650	38,750				8	4,410	2,800	393	82,200	72,550	393	65,500	62,000			
Missouri.....				14	19,100	5,650				64	7,600	2,980	160	43,000	23,300	168	33,500	21,000			
North Dakota.....				22	3,830	1,000				6	1,430	1,000	430	83,300	69,400	76	8,500	3,200			
South Dakota.....				26	19,750	4,230				2	110	130	242	51,800	33,420	70	9,500	9,000			
Nebraska.....				35	69,100	6,730				7	1,720	3,120	347	72,400	66,700	46	7,500	6,000			
Kansas.....				6	1,880	6,520				3	1,400	3,920	855	60,700	74,820	41	7,900	5,000			

# MISCELLANEOUS AGRICULTURAL STATISTICS

947

	42	33,000	28,200	29	12,850	16,640			200	28,420	41,260	6	9,350	1,970	33	5,840	1,240	11	4,810	380
South Atlantic.....																				
Delaware.....									4	100	100									
Maryland.....				7	4,150	9,050			14	3,160	1,680	4	9,200	1,800						
Dist. Columbia.....				1	1,250	5,460														
Virginia.....				12	4,010	1,430			15	7,860	9,140	1	130	100	7	1,000	610	2	2,560	120
West Virginia.....				1	20	70			11	850	760				20	2,870	400			
North Carolina.....	13	12,900	9,200	7	3,850	630			8	800	830	1	20	10	1	90	20	1	290	20
South Carolina.....	8	5,200	6,800						14	2,100	5,880									
Georgia.....	21	14,900	12,200						15	4,550	1,970				4	1,200	190	8	1,970	240
Florida.....				1	70	10			119	9,550	22,000				1	80	20			
East South Central.....	25	50,000	35,000	24	7,390	2,560			94	12,500	6,380	4	610	260	25	5,260	3,920	6	1,270	340
Kentucky.....				4	2,890	30			17	3,450	2,300	2	470	210	7	1,660	2,700			
Tennessee.....	5	6,400	6,800	15	3,880	1,640			49	4,200	950	2	140	60	7	1,000	250			
Alabama.....	14	30,500	9,700	3	250	100			21	2,760	1,600				9	2,260	630	2	960	140
Mississippi.....	6	13,100	18,100	2	640	700			14	2,100	1,600				2	300	40	4	320	200
West South Central.....	182	104,500	64,100	16	5,570	1,570			115	19,100	14,360	108	30,570	33,120	17	2,360	1,990	13	620	190
Arkansas.....	7	2,100	100						86	8,300	3,740	8	300	1,470	8	1,100	220			
Louisiana.....	7	6,400	7,200						25	5,200	4,640	8	770	6,300				1	10	10
Oklahoma.....	93	45,900	14,200	9	2,870	1,130			11	1,100	450	81	24,000	15,120	3	270	370	4	260	40
Texas.....	75	41,100	42,600	7	2,700	440			35	4,500	5,620	16	5,200	11,230	6	900	1,400	8	360	140
Mountain.....	7	1,660	1,000	41	19,860	7,790			91	21,060	28,190	143	28,000	25,960	27	4,560	4,030			
Montana.....				7	2,550	660			6	2,530	1,070	67	10,400	10,820	16	2,930	850			
Idaho.....				13	11,260	5,860			16	1,420	1,920	17	4,200	6,180	2	230	130			
Wyoming.....				3	210	130			4	380	430	7	1,160	1,250	1	100	110			
Colorado.....				7	2,850	800			48	11,300	16,370	42	10,800	8,180	9	1,300	3,000			
New Mexico.....	6	1,100	1,500						3	300	425	2	170	590						
Arizona.....	2	660	100						6	650	1,660									
Utah.....				8	2,440	1,130			13	4,600	4,670	4	450	60						
Nevada.....									2	100	10	1	400	100						
Pacific.....	1	700	800	89	33,660	43,670			496	60,500	188,120	109	12,920	25,220	7	7,080	8,390	41	10,300	12,090
Washington.....				26	15,200	14,690			74	9,550	22,410	63	7,700	14,100		150	10			
Oregon.....				39	8,860	5,340			62	7,950	13,110	24	2,220	2,220	2	1,080	160	7	870	810
California.....	1	700	800	24	10,100	28,880			369	43,000	152,000	22	3,000	8,900	4	5,800	8,220	34	9,430	11,780

1 Including federations, sales agencies, and subsidiaries.

TABLE 517.—Number of marketing and purchasing associations, estimated membership, and estimated amount of business, by geographic divisions and states, 1930-31—Continued

Geographic division and State	Poultry and Poultry products			Tobacco			Wool and Mohair			Miscellaneous selling			Miscellaneous buying			Totals		
	No. listed	Estimated membership (thousands)	Estimated business (thousands)	No. listed	Estimated membership (thousands)	Estimated business (thousands)	No. listed	Estimated membership (thousands)	Estimated business (thousands)	No. listed	Estimated membership (thousands)	Estimated business (thousands)	No. listed	Estimated membership (thousands)	Estimated business (thousands)	Number listed	Estimated membership (thousands)	Estimated business (thousands)
United States.....	160	82,000	\$86,000	13	40,000	\$7,000	136	64,000	\$28,000	474	132,000	\$61,800	1,588	392,000	\$215,000	11,960	3,000,000	\$2,400,000
New England.....	4	520	1,100				6	830		15	800	640	91	47,250	21,880	208	87,900	90,870
Maine.....																		
New Hampshire.....							1	760		2	160	80	28	7,400	3,770	51	9,100	5,080
Vermont.....													9	2,200	2,020	14	2,750	2,600
Massachusetts.....	1	20	370				5	70		9	400	410	1	240	40	46	7,500	11,610
Rhode Island.....										3	133	30	17	35,020	14,000	50	61,330	55,770
Connecticut.....	8	500	320							1	110	20	2	160	110	5	61,440	770
Middle Atlantic.....	13	800	7,880	3	100		43	3,300	310	25	3,780	2,830	233	61,250	1,990	42	6,730	15,090
New York.....	9	380	6,370				20	700	180	7	850	480	120	45,100	41,400	280	115,660	181,390
New Jersey.....	4	420	1,510							5	330	920	25	5,550	3,810	44	8,680	8,790
Pennsylvania.....				3	100		23	2,000	130	13	2,600	1,130	88	10,000	4,890	174	65,840	63,900
East North Central.....	10	3,210	1,300	2	9,000	2,200	6	8,400	1,540	112	39,790	13,490	336	95,200	41,130	3,301	774,010	523,670
Ohio.....	1	90																
Indiana.....	4	1,620	600	1	2,000		2	420	80	6	1,400	1,580	46	16,500	7,300	361	139,390	90,080
Illinois.....	3	900	400							11	3,740	1,890	66	20,500	10,180	332	105,340	45,770
Michigan.....	1	500	180							19	19,950	1,310	62	29,900	7,130	955	236,650	192,220
Wisconsin.....	1	100	30	1	7,000	2,200	1	1,050	90	47	8,550	6,100	62	7,300	4,120	393	136,000	75,070
West North Central.....	23	19,220	11,520	1	300		12	29,000	2,330	146	38,890	20,290	642	128,350	55,080	6,295	1,191,560	730,470
Minnesota.....	1	30					6	3,300	380	11	2,500	1,300	171	37,500	11,430	1,533	296,580	193,980
Iowa.....	2	650	130				2	15,200	270	6	750	780	127	28,500	11,320	1,159	281,860	186,080
Missouri.....	16	16,000	11,160	1	300		3	6,500	800	105	29,650	13,850	130	19,800	15,500	1,645	176,200	94,580
North Dakota.....										20	3,100	320	20	3,100	1,440	536	101,300	86,050
South Dakota.....										35	1,190	6,400	35	6,400	2,160	380	91,060	55,760
Nebraska.....	4	1,950	230				5	2,000	650	4	1,630	1,190	85	22,550	8,650	529	176,840	95,660
Kansas.....							10	2,210				1,620	68	11,000	4,530	483	84,090	87,410

	21	2,230	920	2	9,800	4,200	7	2,330	100	34	10,660	11,010	87	15,200	13,080	472	134,500	119,070
South Atlantic																		
Delaware																		
Maryland																		
District of Columbia																		
Virginia	1	20	30	1	5,800	3,630	3	450	30	1	100	200	17	3,350	2,510	47	25,600	19,000
West Virginia	1	20	30				1	100	10	6	1,250	1,600	54	8,800	7,740	78	26,330	19,440
North Carolina	6	600	180				3	1,800	60	13	1,450	2,300	13	1,100	540	56	8,130	3,690
South Carolina																		
Georgia	6	600	90	1	4,500	740	20	1,800	100	7	1,800	2,300	2	1,100	600	62	22,770	12,770
Florida	6	480	450				7	1,840	67	4	1,310	550	6	870	1,030	23	12,690	12,980
																137	25,620	15,670
																	11,930	28,970
East South Central																		
Kentucky	11	10,100	820	5	20,800	450	19	3,360	280	65	21,980	5,520	31	12,210	4,940	309	145,400	60,380
Tennessee	2	190	20	5	20,800	450	7	1,250	80	3	510	30	8	1,980	440	55	32,600	6,290
Alabama	2	280	20				10	2,000	120	17	2,860	1,180	9	3,150	1,040	109	29,930	12,050
Mississippi	4	9,370	690				2	110	90	22	6,840	2,630	8	1,040	2,120	85	53,060	18,980
	3	310	90							23	12,250	1,690	6	1,040	240	60	30,800	25,080
West South Central																		
Arkansas	24	3,140	830				8	3,360	5,510	30	3,190	3,980	67	13,560	6,400	619	195,800	132,515
Louisiana	2	20	10				2	100	10	4	780	270	10	1,440	430	122	14,290	6,290
Oklahoma	6	250	20				5			5	2,810	610	2	9,410	1,180	49	24,850	18,560
Texas	2	70	40				7			7	1,130	1,950	20	3,000	1,900	230	81,000	35,200
	14	2,800	760				6	3,200	5,800	14	3,460	1,150	36	4,710	2,890	218	76,120	72,145
Mountain																		
Montana	35	16,970	10,940				31	9,710	13,030	33	6,680	3,790	45	9,400	3,370	490	118,230	97,365
Idaho	10	2,120	210				10	3,500	3,400	5	310	70	13	1,360	680	132	25,700	17,700
Wyoming	4	4,080	1,940				6	1,050	1,900	6	2,430	1,390	6	2,300	480	70	26,950	17,980
Colorado	7	1,410	210				4	1,100	1,400	3	1,230	820	4	700	520	33	6,290	4,370
New Mexico	1	2,850	670				4	1,500	2,100	7	640	620	11	3,740	1,190	134	34,960	32,445
Arizona	1	20	10				1	610	1,400	4	170	90	2	620	220	25	4,110	4,415
Utah	1	10	10				1	100	820	3	880	620	3	280	190	18	2,490	3,005
Nevada	2	6,200	7,960				1	1,720	2,200	4	1,020	180	5	870	120	40	16,800	16,305
	3	300	220				1	130	310				1	80	10	8	960	600
Pacific																		
Washington	19	25,800	50,900				4	3,710	2,530	14	1,340	690	56	5,980	19,130	838	102,230	301,550
Oregon	5	13,900	20,570				1	50	10	4	220	70	34	950	3,360	208	47,730	76,470
California	8	2,900	2,540				2	3,400	1,780	5	690	240	7	730	780	151	28,190	28,280
	11	9,000	27,890				1	260	740	6	420	330	15	4,300	15,000	479	86,310	249,800

TABLE 518.—*Associations marketing dairy products: Number listed and estimated business, 1925, 1926, 1928, 1929, and 1930*

Calendar year	Creamery associations		Cheese-making associations		Milk-distributing associations		Milk-bargaining associations		Miscellaneous associations <sup>1</sup>		Total associations	
	Listed	Estimated business	Listed	Estimated business	Listed	Estimated business	Listed	Estimated business	Listed	Estimated business	Listed	Estimated business
	Number	1,000 dollars	Number	1,000 dollars	Number	1,000 dollars	Number	1,000 dollars	Number	1,000 dollars	Number	1,000 dollars
1925.....	1,400	222,000	600	25,000	140	160,000	40	125,000	17	3,000	2,197	535,000
1926.....	1,390	230,000	751	32,000	119	135,000	40	192,000	179	11,000	2,479	600,000
1928.....	1,400	245,000	740	30,000	114	150,000	47	200,000	199	15,000	2,500	640,000
1929.....	1,385	264,804	717	27,931	111	138,694	50	229,251	195	19,320	2,458	680,000
1930.....	1,368	219,870	731	21,790	101	142,130	50	227,460	187	28,750	2,435	640,000

Federal Farm Board.

<sup>1</sup> Including federations, sales agencies, warehouse associations, associations manufacturing ice cream, milk powder, etc.<sup>2</sup> Not including amounts reported by federations, sales agencies, etc.<sup>3</sup> Including associations marketing cream. In subsequent years these were included among the miscellaneous associations.TABLE 519.—*Number of active wheat pools, quantity of wheat handled, and percentage which pool wheat was of total wheat,<sup>1</sup> 1921-22 to 1928-29*

Marketing season	Pools reporting	Wheat received by pools	Percentage pool wheat is of total wheat <sup>1</sup>	Marketing season	Pools reporting	Wheat received by pools	Percentage pool wheat is of total wheat <sup>1</sup>
	Number	Bushels	Per cent		Number	Bushels	Per cent
1921-22.....	3	11,372,768	2.3	1926-27.....	9	17,494,726	3.0
1922-23.....	10	20,263,610	3.5	1927-28.....	8	12,335,546	1.9
1923-24.....	11	24,446,621	4.8	1928-29.....	7	14,879,859	2.2
1924-25.....	10	27,967,244	4.4	1929-30.....	8	17,573,537	3.1
1925-26.....	9	16,823,560	3.5	1930-31.....	9	24,206,974	4.7

Federal Farm Board.

<sup>1</sup> Shipped out of country where grown. Yearbook, 1931:592, Table 11.TABLE 520.—*Cooperative citrus-fruit shipments and such shipments as a percentage of production for specified areas, 1920-21 to 1930-31*

Marketing season	Packed boxes handled by associations in—							
	California and Arizona		Alabama and Florida		Texas		United States	
	Boxes	Per cent <sup>1</sup>	Boxes	Per cent <sup>1</sup>	Boxes	Per cent <sup>1</sup>	Boxes	Per cent <sup>1</sup>
1920-21.....	21,806,253	81.8	3,905,841	27.9	-----	-----	25,712,094	63.2
1921-22.....	12,847,455	74.8	3,908,395	27.6	-----	-----	16,755,850	53.3
1922-23.....	19,810,048	82.5	5,443,758	30.3	-----	-----	25,253,806	59.9
1923-24.....	21,671,344	69.1	5,548,241	25.8	26,570	87.4	27,246,155	51.3
1924-25.....	17,635,860	74.3	6,375,759	31.6	65,690	29.5	24,077,309	54.4
1925-26.....	23,011,773	71.7	4,198,316	25.4	38,624	18.4	27,243,713	55.7
1926-27.....	25,427,062	69.3	4,860,948	26.2	95,053	26.4	30,383,063	54.4
1927-28.....	21,810,826	72.8	3,876,577	25.0	124,115	23.9	25,811,518	55.8
1928-29.....	32,129,643	67.1	7,268,739	28.5	262,459	31.2	39,660,841	53.2
1929-30.....	22,980,811	72.5	5,549,105	32.2	453,043	32.2	28,982,959	57.3
1930-31.....	31,879,555	77.1	10,277,883	38.8	363,430	45.0	42,517,868	46.0

Federal Farm Board.

<sup>1</sup> Per cent of production for the specified area.

TABLE 521.—*Livestock handled, sales, and purchases by terminal market cooperative sales agencies, 1918-1931*

Calendar year	Receipts of livestock <sup>1</sup>					Livestock purchased	
	Associa- tions reporting	Cattle and calves	Hogs	Sheep	Total <sup>2</sup>	Associa- tions reporting	Animals
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
1918.....	3	30, 523	139, 483	7, 548	189, 283	1	252
1919.....	4	63, 876	381, 127	23, 940	663, 853	2	8, 504
1920.....	4	85, 313	536, 380	29, 676	748, 255	2	6, 580
1921.....	6	163, 361	912, 095	103, 101	1, 310, 628	3	42, 032
1922.....	16	736, 982	3, 414, 016	352, 881	4, 727, 056	4	86, 350
1923.....	23	1, 409, 322	7, 732, 437	733, 552	9, 933, 445	8	103, 928
1924.....	26	1, 893, 326	9, 239, 070	1, 202, 616	11, 382, 304	14	242, 039
1925.....	28	1, 881, 241	7, 377, 084	1, 350, 811	10, 666, 069	18	288, 150
1926.....	27	2, 003, 014	6, 687, 296	1, 581, 882	10, 333, 307	18	328, 016
1927.....	28	1, 678, 004	7, 149, 561	1, 598, 465	10, 426, 120	21	280, 808
1928.....	28	1, 751, 599	8, 483, 413	1, 686, 889	11, 921, 901	18	325, 267
1929.....	28	1, 904, 066	8, 054, 184	2, 093, 136	12, 051, 386	20	377, 648
1930.....	30	2, 038, 411	7, 259, 731	2, 609, 604	11, 957, 746	22	723, 422
1931.....	34	2, 201, 994	7, 083, 563	2, 969, 464	12, 255, 021	28	634, 535

Calendar year	Total livestock handled		Value of sales <sup>3</sup>	Value of pur- chases	Value of business handled	
	Associa- tions reporting	Animals <sup>4</sup>			Associa- tions reporting	Total <sup>5</sup>
	<i>Number</i>	<i>Number</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Number</i>	<i>Dollars*</i>
1918.....	3	189, 535	12, 384, 348	15, 901	4	12, 400, 249
1919.....	4	571, 887	35, 178, 255	622, 335	6	35, 800, 590
1920.....	4	754, 805	37, 419, 935	458, 821	6	37, 878, 759
1921.....	6	1, 352, 660	35, 309, 401	891, 972	6	36, 204, 373
1922.....	10	4, 813, 406	101, 818, 588	3, 069, 638	18	104, 888, 226
1923.....	23	10, 037, 373	191, 954, 106	4, 631, 630	23	196, 904, 508
1924.....	26	11, 624, 343	231, 372, 776	5, 222, 121	24	236, 594, 897
1925.....	28	10, 954, 219	271, 797, 282	7, 023, 373	24	279, 720, 654
1926.....	27	10, 661, 323	278, 900, 462	8, 249, 106	24	293, 249, 470
1927.....	28	10, 793, 681	145, 202, 942	3, 036, 904	28	274, 206, 345
1928.....	28	12, 339, 000	279, 674, 261	8, 741, 163	28	289, 152, 931
1929.....	28	12, 755, 647	302, 894, 984	11, 627, 701	28	314, 522, 635
1930.....	30	12, 857, 965	263, 679, 996	10, 008, 169	30	273, 686, 165
1931.....	34	13, 045, 854	173, 268, 784	6, 766, 706	34	180, 601, 072

Federal Farm Board.

<sup>1</sup> Includes some animals sold for yard traders.<sup>2</sup> Includes animals not segregated by kind.<sup>3</sup> Includes animals handled from producers to feeders.<sup>4</sup> Includes transactions for yard traders.<sup>5</sup> Includes business not classified as sales or purchases.

TABLE 522.—*Cooperative extension workers:*<sup>1</sup> *Number employed, United States, June 30, 1930, and June 30, 1931*

State or Territory	County agricultural agents and assistants		County home demonstration agents and assistants		County club agents and assistants		Administrators and supervisors		Subject matter specialists		Total of all agents	
	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931
Alabama	No. 88	No. 92	No. 57	No. 58	No.	No.	No. 13	No. 13	No. 18	No. 25	No. 176	No. 188
Alaska							3	3				3
Arizona	14	17	6	7			3	3	9	4	32	31
Arkansas	83	78	67	68			14	15	16	18	180	179
California	85	86	30	28	1		12	10	20	23	148	147
Colorado	33	33	9	11	5		5	5	13	14	65	63
Connecticut	10	10	8	8	12	13	5	5	21	25	56	61
Delaware	3	3	3	3	3		3	3	5	5	17	17
Florida	55	49	40	39			13	12	7	13	115	113
Georgia	120	121	58	56			17	16	35	38	260	271
Hawaii	5	5	4	5			3	3	2	3	14	16
Idaho	26	26	7	7	2	2	6	6	18	20	59	61
Illinois	104	110	27	32	3	4	14	13	27	31	175	190
Indiana	84	85	3	12	8	7	12	13	30	30	142	147
Iowa	102	105	22	24	8	10	16	17	68	73	216	229
Kansas	75	82	31	35	5	4	12	12	39	40	162	173
Kentucky	93	94	26	30			17	18	28	37	164	179
Louisiana	78	76	40	44			16	16	17	19	151	155
Maine	15	15	14	14	7	7	4	5	9	9	49	50
Maryland	31	31	24	26			6	6	31	35	92	98
Massachusetts	16	19	15	16	27	28	7	8	15	18	80	89
Michigan	65	66	9	8	16	14	18	17	55	60	163	165
Minnesota	67	71	14	17	33	26	14	13	29	33	187	160
Mississippi	90	89	78	73			19	19	19	18	206	199
Missouri	67	68	18	16			10	10	29	34	124	128
Montana	83	35	13	14			5	5	16	19	72	73
Nebraska	45	47	10	13	1	2	5	8	22	25	88	95
Nevada	12	11	5	5			3	3	2	3	22	22
New Hampshire	11	11	9	10	14	13	5	5	10	14	49	53
New Jersey	23	23	22	19	8	9	5	5	17	19	75	75
New Mexico	20	19	13	12			5	6	4	7	42	44
New York	76	83	57	55	39	44	12	12	76	71	260	265
North Carolina	105	104	63	63			15	16	24	24	207	207
North Dakota	34	32	6	6			6	6	18	19	64	63
Ohio	90	79	25	23	10	10	12	15	53	64	195	196
Oklahoma	91	93	61	66			16	16	15	26	183	201
Oregon	85	34	7	7	8	8	8	7	18	20	74	76
Pennsylvania	71	73	34	44			11	12	45	44	161	173
Porto Rico									1	1	1	1
Rhode Island	3	3	2	3	3	3	3	3	5	5	16	17
South Carolina	65	64	55	55			15	14	28	29	163	162
South Dakota	32	32	15	14	6	5	6	5	15	17	74	73
Tennessee	95	92	64	53			12	13	18	24	179	182
Texas	206	219	141	146			26	26	16	21	889	412
Utah	20	22	6	6			4	5	10	14	40	47
Vermont	13	13	12	10	11	11	5	4	9	9	50	47
Virginia	104	106	52	53			18	18	36	36	203	213
Washington	36	36	10	12	5	5	3	3	9	10	63	66
West Virginia	43	44	21	25	4	15	13	11	24	19	105	114
Wisconsin	67	55	4	4	8	8	12	12	40	43	121	122
Wyoming	21	22	10	10			4	4	13	14	48	50
Total	2,755	2,783	1,352	1,410	247	251	488	495	1,100	1,222	5,942	6,161

Extension Service.

<sup>1</sup> Includes both white and negro extension workers.

# MISCELLANEOUS AGRICULTURAL STATISTICS

953

TABLE 523.—*Cooperative extension work: Projects and percentage of agents' and specialists' time devoted to each, 1925-1930*

Project	1925	1926	1927	1928	1929	1930
	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
Soils.....	5.2	5.3	4.8	5.1	5.1	5.1
Farm crops.....	13.1	13.1	12.4	11.5	11.6	12.2
Horticulture.....	6.9	7.3	7.1	7.3	7.0	8.7
Forestry.....	0.5	0.7	0.9	1.0	1.0	0.9
Animal husbandry.....	7.1	7.5	8.2	7.8	7.6	6.5
Dairy husbandry.....	7.0	7.1	7.0	8.7	8.6	7.7
Poultry husbandry.....	8.7	9.0	8.8	8.1	7.9	7.6
Rural engineering.....	3.7	3.6	3.4	3.3	3.2	3.3
Rodents and insects.....	2.0	1.7	1.5	1.3	1.1	1.3
Agricultural economics.....	3.9	4.0	4.1	4.0	4.3	6.2
Foods and nutrition.....	7.1	7.2	7.1	7.0	7.5	7.0
Child care and training.....						0.6
Clothing.....	7.9	7.1	6.8	6.8	6.9	6.7
Home management.....	1.7	1.5	1.5	1.7	2.2	2.1
House furnishing.....	1.2	1.8	2.0	2.4	2.6	2.6
Home health and sanitation.....	1.2	1.2	1.2	1.2	1.2	1.3
Community activities.....	6.2	5.9	6.0	5.8	5.9	4.0
Miscellaneous projects.....	16.6	16.0	16.3	17.0	16.8	7.5
Building extension program.....						3.7
Organization.....						7.1

Extension Service.

<sup>1</sup> Only field work of specialists as reported by county extension agents is included.

TABLE 524.—*Extension activities and accomplishments, 1925-1930, as reported by all county extension agents*

Activity or accomplishment relating to extension	1925	1926	1927	1928	1929	1930
	Number	Number	Number	Number	Number	Number
Total number of—						
Farm visits made.....	1,382,197	1,388,469	1,439,503	1,508,510	1,633,154	1,758,743
Home visits made.....	386,996	387,724	396,093	432,433	489,294	546,308
Office calls received.....	3,010,381	3,340,242	3,600,448	3,687,870	3,991,725	4,317,565
Telephone calls received.....	2,085,694	2,333,268	2,476,572	2,556,899	2,710,723	3,015,707
News articles or stories published.....			334,271	371,331	423,600	449,854
Individual letters written.....	3,767,180	4,015,126	4,208,801	4,510,657	4,712,940	4,501,988
Different circular letters prepared.....						214,561
Bulletins distributed.....			5,120,768	5,608,604	6,345,488	6,657,561
Radio talks made.....						4,148
Events at which exhibits were shown.....	8,269	8,938	8,983	8,999	9,826	20,476
Training meetings held for local leaders.....	27,887	29,109	38,064	42,902	41,604	42,908
Method demonstration meetings held.....	332,093	387,051	398,051	437,993	486,398	402,458
Meetings at result demonstrations.....						66,368
Tours conducted.....						8,772
Achievement days held.....						14,720
Encampments held.....	2,051	2,716	3,145	2,781	2,921	8,762
All meetings held.....	549,786	599,797	636,588	688,305	771,821	750,379
Total attendance at all meetings held.....	18,581,358	19,735,616	21,421,376	21,951,317	24,878,236	25,605,485
Total number—						
Result demonstrations conducted.....	772,469	644,784	772,185	851,526	929,744	934,182
Voluntary local leaders assisting with—						
Adult extension.....	160,587	173,122	183,065	179,559	201,882	233,043
Junior extension.....	47,996	48,899	60,182	65,258	71,636	85,344
Total number of—						
Adult home demonstration groups.....						34,639
Members of such groups.....						646,340

Extension Service.

TABLE 525.—*4-H club work: Number of clubs, enrollment, projects completed, etc., 1925-1930*

Item	1925	1926	1927	1928	1929	1930
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Junior clubs.....	41, 286	41, 284	44, 188	46, 671	52, 180	56, 180
Different boys enrolled.....	224, 633	234, 078	249, 553	270, 534	308, 509	338, 197
Different girls enrolled.....	340, 413	352, 078	370, 189	393, 406	452, 587	489, 517
Total enrollment.....	565, 046	586, 156	619, 712	663, 940	756, 096	822, 714
Different boys completing.....	133, 076	145, 202	153, 324	175, 069	201, 910	222, 472
Different girls completing.....	196, 498	223, 108	245, 783	272, 510	305, 577	331, 873
Total completing.....	329, 574	368, 305	399, 107	447, 579	507, 487	554, 345
Projects started.....	1, 079, 604	1, 161, 024	1, 330, 239	1, 466, 584	1, 614, 149	1, 535, 619
Projects completed (total) <sup>1</sup> .....	589, 440	673, 997	776, 029	882, 795	995, 262	971, 308
Cereals.....	24, 629	24, 107	25, 789	26, 997	29, 197	35, 380
Legumes and forage.....	4, 549	4, 988	5, 253	6, 137	7, 559	7, 902
Potatoes, cotton, and other special crops.....	29, 854	30, 458	25, 228	26, 475	40, 380	45, 010
Horticulture.....	62, 577	81, 494	88, 922	112, 296	124, 459	123, 751
Forestry.....	308	730	2, 192	2, 719	3, 852	5, 379
Rural engineering.....						6, 701
Dairy.....	17, 142	19, 094	23, 076	29, 468	37, 218	36, 554
Animal husbandry.....	31, 250	37, 409	44, 341	48, 233	54, 227	57, 790
Poultry.....	52, 795	52, 730	56, 756	56, 900	60, 020	61, 519
Agricultural economics.....	6, 841	6, 139	4, 925	8, 361	7, 379	6, 448
Foods.....	105, 856	131, 121	142, 302	167, 058	182, 877	193, 242
Nutrition.....	39, 259	39, 071	54, 451	62, 790	65, 652	4, 508
Child training and care.....						209, 656
Clothing.....	128, 970	133, 501	146, 181	162, 291	190, 249	17, 472
Home management.....	6, 477	10, 215	13, 822	16, 309	16, 237	49, 571
House furnishings.....	22, 268	24, 534	30, 024	36, 274	40, 999	67, 810
Home health and sanitation.....	28, 032	40, 857	55, 352	59, 342	77, 932	42, 615
Miscellaneous.....	28, 638	37, 249	56, 415	51, 145	57, 025	

Extension Service.

<sup>1</sup> Boys' and girls' club members completing.TABLE 526.—*Imports and price per pound of raw silk and production, imports and price per pound of rayon yarn, United States, 1921-1931*

Calendar year	Raw silk		Rayon yarn			
	Net imports <sup>1</sup>	Average price <sup>2</sup>	Production	Net imports <sup>3</sup>	Average price <sup>4</sup>	
					150 A denier	300 A denier
	<i>1,000 pounds</i>	<i>Dollars</i>	<i>1,000 pounds</i>	<i>1,000 pounds</i>	<i>Dollars</i>	<i>Dollars</i>
1921.....	51, 846	6. 035	15, 000	3, 419	2. 671	2. 479
1922.....	57, 827	7. 219	24, 406	2, 993	2. 800	2. 650
1923.....	61, 511	8. 228	36, 477	6, 515	2. 800	2. 650
1924.....	59, 626	5. 917	37, 720	6, 569	2. 113	1. 871
1925.....	76, 008	6. 341	51, 902	12, 363	2. 004	1. 754
1926.....	76, 870	5. 937	63, 648	13, 918	1. 810	1. 603
1927.....	35, 036	5. 100	75, 555	17, 740	1. 489	1. 289
1928.....	37, 172	4. 859	97, 901	15, 113	1. 500	1. 300
1929.....	96, 848	4. 777	121, 596	20, 315	1. 246	1. 073
1930 <sup>5</sup> .....	80, 581	3. 173	110, 208	6, 009	1. 059	. 900
1931 <sup>6</sup> .....	87, 608	2. 233	144, 350	3, 460	. 758	. 636

Bureau of Agricultural Economics. Compiled from annual issues of Commerce and Navigation of United States Department of Commerce, except production of rayon yarn which is from Yearbook of the Department of Commerce. Prices are from bulletins of the U. S. Bureau of Labor Statistics.

<sup>1</sup> Net imports are imports minus reexports.<sup>2</sup> Average of monthly average prices of Japanese Kansai, No. 1.<sup>3</sup> Net imports are imports minus reexports 1921-1924. Subsequent years are imports minus exports and reexports.<sup>4</sup> Average of monthly average prices. The count indicates the number of deniers or one-half decigram units, in weight, of a standard length of 450 meters. Since the standard is based on an arbitrary fixed length and a variable weight, the finer the yarn the smaller the count; 150 denier count, a size commonly used, is fine and 300 denier count is coarse.<sup>5</sup> Average of monthly average prices of Japanese Best, No. 1 x 13-15.<sup>6</sup> Preliminary.

# INDEX

	Page
Abaca, imports, 1899-1931.....	864
Account books, farmers', aid to research.....	197-200
Accounting, home, headway among farm women. Mary Rokahr.....	214-246
Accounts, keeping, benefits to farm women.....	245-246
Agricultural—	
by-products, utilization by industry.....	74-75
commodities act, violations, discussion by Secretary.....	55
depression, factors contributing, discussion by Secretary.....	5-6, 10
expansion, policy, results.....	468-470
exports, index numbers, 1909-1931.....	860
products—	
exports, destination, 1927-1931.....	865-872
foreign trade, statistics.....	858-885
imports, origin, 1927-1931.....	873-879
selected, exports, 1899-1931.....	861-862
selected, imports, 1899-1931.....	863-864
relief, variety of subsidy plans for, adoption by foreign countries. Lynn Ramsey Edminster.....	212-215
statistics.....	577-584
statistics, miscellaneous.....	914-954
workers, numbers, decrease.....	498-499
Agricultural Engineering, Bureau of, work, discussion by Secretary.....	56
Agricultural Experiment Stations, office of, work, review by Secretary.....	97-98
Agriculture—	
American, world influences upon, report by Secretary Hyde.....	1-98
foreign, influence of American machinery. R. B. Gray.....	453-455
Airways forecasts, organization by Weather Bureau.....	96-97
ALEXANDER, LUCY M.: Lamb Becomes More Tender When Ripened by Period of Storage. With K. F. Warner.....	260-263
Alfalfa—	
damage by stem nematode.....	99, 100
foreign varieties, introduction by explorers.....	298, 300
meal, prices, 1922-1932.....	758
meals—	
value, comparison.....	308
value in chick rations, experiments. Burt W. Heywang.....	307-309
seed—	
soreage, yield, and production, 1929-1931.....	766
prices, farm, 1922-1932.....	766, 767
stem nematode—	
cause of severe damage in western areas. Gerald Thorne.....	99-101
control measures.....	100-101
description and habits.....	99-100
ALLEN, H. W.: Oriental Fruit Moth's Partial Control by Its Parasites Is Expected.....	277-278
Almonds—	
imports, origin, 1927-1931.....	877
prices, farm 1922-1931.....	695
production and value, 1922-1931.....	695
shelled, imports, 1899-1931.....	864
Ammonia—	
free, combination with superphosphate, success as fertilizer. Wm. H. Ross and K. D. Jacob.....	535-537
use in superphosphates, results.....	76
Animal—	
industry, progress.....	56-60
products—	
exports and imports, value, 1928-1931.....	859
exports, destination, 1927-1931.....	865, 867
imports, origin, 1927-1931.....	875-874
<i>See also Dairy products: Poultry.</i>	

	Page
Animals—	
exports and imports, value, 1928-1931.....	850
imports, origin, 1927-1931.....	873
predatory, control progress.....	84-85
predatory, control work, 10-year program (with rodents). Stanley P. Young.....	312-315
<i>See also Livestock; Wild life; and specific kinds.</i>	
ANNAND, P. N.: Beet Leaf Hoppers' Origin Important in Control and in Prediction of Attack. With E. W. Davis.....	110-113
Anthracnose, of snap beans, immunity of seed grown in West. L. L. Harter.....	311
Apiculture. <i>See</i> Bee culture.	
Appalachians, southern, charcoal lands in, reclamation by forestry. R. M. Evans.....	228-230
Apparatus, for testing tenderness of canned foods, use.....	366-368
Apple diseases, fluctuation and need of prompt action.....	294, 296-297
Apples—	
car-lot shipments, 1919-1931.....	695, 697
cold-storage holdings, 1922-1931.....	696
dried, exports, 1912-1931.....	563
exports—	
1919-1931.....	695
destination, 1927-1931.....	867, 868
fresh, exports, 1899-1931.....	861
imports, 1919-1931.....	695
prices—	
farm, 1919-1931.....	695, 699
at Boston, 1919-1931.....	693
production, 1919-1931.....	695, 696
trade, international, 1925-1930.....	699
Apricots—	
dried and canned, exports, 1912-1931.....	562
exports, destination, 1927-1931.....	863
prices, farm, 1922-1931.....	699
production and value, 1922-1931.....	699
Asparagus—	
acreage and production, 1928-1931.....	700
prices, farm, 1928-1931.....	700
Asses—	
number, 1926-1931.....	821
statistics.....	821
Automobiles. <i>See</i> Motor vehicles.	
BABB, M. F.: Vegetable Growing Finds Favorable Conditions in Some Great Plains Valleys.....	387-389
BABCOCK, C. J.: Cream to Whip Readily Must Be of the Proper Temperature and Age.....	155-156
Bacon—	
exports—	
1899-1931.....	861
destination, 1927-1931.....	865
prices, at Bristol, England, 1909-1931.....	794
Bacteria, study by time-lapse motion-picture camera.....	369
BAER, WM. S.: Discovery of Method of Treating Osteomyelitis.....	206-210
Baits, for rodents, study.....	325-328
BAKER, A. L.: Beef Cattle, if Vigorous, Can Be Wintered on Range in Northern Great Plains.....	103-106
BAKER, O. E.—	
Present Trends Indicate Farm Area of U. S. not Likely to Increase Much.....	452-467
Regional Shifts in Crop Acreage Shown by Census Have Been Extensive.....	479-483
BALCH, R. T.: Sweetpotatoes Yield Fine White Starch by a New Process. With H. S. Paine.....	522-524

	Page		Page
Bananas, imports—		Bees, package, use as pollinating agents in orchards. W. J. Nolan.....	279-280
1899-1931.....	863	Beet leaf hoppers, source and movement, importance in prediction of attack. F. N. Annand and E. W. Davis.....	110-113
origin, 1927-1931.....	876	BENNETT, CHARLES A.: Seed-Cotton Drying Proves Profitable; Two Types of Driers Used.....	433-435
Bank failures, effect on agriculture, discussion by Secretary.....	44, 45	BENNETT, H. H.: Soil-Erosion Problem under Investigation in National Control Program.....	344-351
Bankruptcies, farm, 1910-1930.....	906	Berry breeding for new specific-purpose varieties. George M. Darrow and George F. Waldo.....	113-114
Banks, Federal intermediate credit, assistance to farmers' cooperative associations.....	507	Big trees, relic of an ancient flora, found in Sierra Nevada. Oscar Evans.....	115-116
BARGER, W. R.: Orange Refrigeration in Ocean Transport is Best When Fruit is Precooled.....	276-277	Bird refuges.....	
Barley—		cooperative, agencies.....	117
acreage—		on the farm, value and requirements. W. L. McAtee.....	116-118
and production, 1900-1931.....	630-631, 634-635	Birds.....	
increase, 1919 to 1929.....	486-487	economic value.....	116-117
exports—		gallinaceous, immunity to strychnine.....	326-327
1899-1931.....	630, 662	migratory, refuges, acquisition.....	84
destination, 1927-1931.....	689	<i>See also Game, Wild life.</i>	
farm value, 1900-1931.....	630	BISHOP, F. C.: Flies Aid Surgeons in Combating a Persistent Bone Disease of Man.....	206-210
imports, 1900-1931.....	630	Poultry Lice Cause Heavy Losses Which Are Wholly Preventable.....	300-310
marketings by farmers, 1921-1931.....	636	Black fly, control by parasites, discussion by Secretary.....	71
prices—		Black locust, value in erosion control.....	227-228
farm, 1900-1931.....	630, 637	Blackhead, in turkeys, control studies.....	189-190
market, 1909-1932.....	632, 639	Blowflies, use in combating osteomyelitis.....	206-210
receipts—		Bollworm, pink, prevention of spread, discussion by Secretary.....	72
at markets, 1921-1931.....	636	Bone disease of man, combating by use of flies as aid to surgeons. F. C. Bishop.....	206-210
by grades, 1928-1931.....	636	Borer, corn. <i>See</i> Corn borer.	
stocks in store, 1926-1930.....	637	BOSWELL, VICTOR R.: Vegetable Standardization and Variety Description Project is in Progress.....	389-392
trade, international, 1925-1931.....	638	BOYD, GEORGE R.: Remediable Condition of Farm Often Hampers Use of Machines.....	435-437
world production, 1894-1932.....	633	Bran, prices, wholesale, 1922-1932.....	506
yields, 1900-1931.....	630, 632, 634-635	Bread, prices in leading cities, 1922-1932.....	596
BARNES, C. P.: Crops Occupy Nearly Half the Cultivable Acreage of the United States. With F. J. Marschner.....	470-474	Breeding—	
BEAN, L. H.: Farm Prices and Incomes Reflect Business and Financial Conditions. 200-205		berries, for specific purposes.....	113-114
Bean—		experiments with guinea pigs.....	251-254
beetle, Mexican—		poultry, methodical, cause of increasing egg size and numbers. J. P. Quinn.....	182-184
control.....	68-69, 271	sheep, Shropshire, work at Beltsville experiment farm.....	339-341
distribution and survival. Neale F. Howard.....	270-271	wheat, for resistance to some strains of bunt, susceptibility to other strains. H. II. Flor.....	302-303
blight, scarcity in West.....	341	Bridges, State, disbursements, 1930.....	935
Beans—		Broadcasting information, correlation of Federal and State agencies.....	315-316
culture in Wyoming.....	389	Brooders, battery, kinds and use in raising chickens.....	311
dry, edible—		Broomcorn—	
acreage and value, 1899, 1909, 1914-1931.....	744	acreage and production, 1915-1931.....	751-752
car-lot shipments, 1920-1931.....	746	prices, farm, 1915-1931.....	751-752
exports, 1917-1930.....	744	supply and distribution, 1924-1931.....	752
farm prices, 1914-1931.....	744	yields, 1915-1931.....	751-752
imports, 1909, 1914-1931.....	744	BROWN, E.: Seed-Testing Service Protects Farmer in Case of Many Principal Crops. With F. H. Hillman and E. H. Toole.....	333-335
market prices, 1899, 1909, 1914-1931.....	744, 746	Brown-tail and gipsy moth infestations, check by imported parasites. O. W. Collins and T. H. Jones.....	236-239
production, 1899, 1909, 1914-1931.....	744-745	BROWN, C. A.: Chemical Utilization of Farm By-Products Has Large Prospects.....	513-517
yields, 1899, 1909, 1914-1931.....	744	BROWN, F. L.: Farm Buildings Should be Repainted before Wood Weathering Begins.....	196-197
imports, 1899-1931.....	863	Buckwheat—	
snap—		acreage and production, 1919-1931.....	654
car-lot shipments, 1920-1931.....	700	exports, 1919-1931.....	654
freedom from anthracnose and blight in West. L. L. Harter.....	341	farm value, 1919-1931.....	654
BEATLE, E. KENT: Dutch Elm-Disease Survey Indicates this Disease not Widespread in this Country.....	178-181	imports, 1919-1931.....	654
BECKER, JOSEPH A.: Drought Losses of 1880 and 1931 Indicated by Crop and Income Data.....	170-178	prices, farm, 1919-1932.....	654, 655
Regional Shifts Large in Major Crop Acreage during Decade 1919-1929.....	484-487	yields, 1919-1931.....	654, 655
Bedding-out system, advantages for sheep. Glen A. Smith.....	333-337	Buildings, farm, valuation, changes.....	477-478
Bee-culture research, inauguration on Pacific coast. E. L. Sechrist.....	101-102	Bulls, dairy, from proved sires, effect on daughters' output. C. J. Stauber.....	156-158
Beef—			
carcasses, finish, grading chart.....	108		
cattle. <i>See</i> Cattle, beef; Cows, beef; Heifers, beef.			
demonstrations, effect on home meat supply.....	557-558		
exports, 1899-1931.....	861		
imports, 1899-1931.....	863		
prices—			
retail, effect of livestock market trend, study.....	263-270		
wholesale, 1929-1931.....	816		
products—			
exports, 1899-1931.....	861		
trade, international, 1925-1930.....	780		
stocks on hand, 1922-1931.....	781		
trade, international, 1925-1930.....	780		
value of heifers, comparison with steers.....	107-110		
<i>See also Meat.</i>			

	Page		Page
Bunt—		Carrots—	
species, hybridization, results.....	393	acreage and production, 1928-1931.....	704
wheat, cause.....	392-393	car-lot shipments, 1920-1930.....	705
wheat, reduction by disinfection of seed.....	398-401	prices, farm, 1928-1931.....	704
BURRESS, A. F.: Gipsy-moth Eradication		Casein, tariff on, effects.....	62
Project in New Jersey Apparently Success-		Cats, repelling from flower beds by use of	
ful.....	239-244	nicotine sulphate. James F. Couch.....	169-170
Butter—		Cattle—	
creamery—		beef—	
cold-storage holdings, 1922-1931.....	837	finishing by supplementing pasture, in-	
prices, wholesale, 1910-1931.....	840, 841	crease in Texas. John H. Jones.....	102-103
production by factories, 1922-1930.....	835-836	prices, farm 1922-1931.....	777
receipts at markets, 1922-1931.....	837, 838	prices, market, 1909-1931.....	776-775
exports—		statistics.....	778, 779, 782-783
1899-1931.....	801	wintering on range in northern Great	
destination, 1927-1931.....	805	Plains. A. L. Baker.....	103-106
imports—		dairy. See Bulls, dairy; Cows, dairy.	
1890-1931.....	803	dipping by means of octagonal vat, ad-	
origin, 1927-1931.....	873	vantages.....	122-124
prices, export, in Copenhagen, 1922-1931.....	840	farm value, 1957-1932.....	770-771
renovated—		feeder, inspected, shipments from stock-	
factories operating in 1917-1931.....	320	yards, 1922-1931.....	776
industry decline. Chas. S. Trimble.....	320-321	hides, imports, 1899-1931.....	893
storage in 1-pound prints, keeping value.		imports, origin, 1927-1931.....	873
William White.....	118-119	income from, and value, 1930.....	782-783
trade, international, 1925-1930.....	839	numbers, 1840, 1850, 1860, 1867-1932.....	770-773
Butterfat—		pasture requirements on dry land.....	173-174
output, effect of sires from proved sires.....	156-158	production value, 1930.....	782-783
prices, farm, 1922-1931.....	835	purebred, number registered, 1921-1931.....	828
production, cost, and value per cow, 1930.....	830	receipts at stockyards, 1922-1931.....	774-775
BUTTERFIELD, L. C.: Cattle-Dipping Vats of		shipments and slaughter, 1930.....	782-783
Octagonal Shape Meet with Success in		slaughter—	
Nevada.....	122-124	in specified countries, 1921-1931.....	778
BYRLEY, THEODORE C.: Egg Hatching Pre-		under Federal inspection, 1922-1931.....	779
vented by Certain Bone Defects of the		tick eradication, status, 1931.....	781
Developing Embryo.....	181-182	tuberculin testing, 1920-1931.....	828
		See also Bulls; Calves; Cows; Dairy bulls;	
		Dairy herd; Heifers; Steers.	
Cabbage—		Caniflow, culture in Colorado.....	388
acreage and production, 1928-1931.....	701-702	Calery	
car-lot shipments, 1920-1930.....	708	acreage and production, 1928-1931.....	705
prices, farm, 1928-1931.....	701-702	car-lot shipments, 1920-1930.....	705
variety, Jersey Queen, resistance to yellows		prices, farm, 1928-1931.....	705
J. C. Walker.....	119-121	Callulose, potential yield in farm waste.....	515
yellows—		Cereal crops, production in 1931.....	20
control by resistant strain of cabbage.....	119-121	Cereals, disease-resistant foreign varieties,	
resistance of Jersey Queen to J. C.		Introduction.....	300
Walker.....	119-121	CHACE, E. M.: Citrus By-Products Market	
Cacao beans, imports—		is Growers' Safeguard in Years of Over-	
1899-1931.....	803	Production.....	517-518
origin, 1927-1931.....	874	Charcoal lands, cut-over, reclamation for	
CALHOUN, WENDELL: Fruit and Vegetable		forestry in southern Appalachians. R. M.	
Depots Facilitate Distribution in Big City		Evans.....	228-230
Markets.....	233-236	CHATFIELD, CHARLOTTE: Food-Composition	
California—		Data Aid Research Workers to Interpret	
big trees, numbers and location.....	115-116	Food Standards.....	565
forest fires, fighting with water. Walter E.		Cheese—	
Jotter.....	220-222	American—	
Calves—		Cheddar, production, 1920-1930.....	841-842
heifer—		prices, wholesale, 1924-1931.....	844
comparison with steers in meat study.....	108-110	cold-storage holdings, 1922-1931.....	843
number on farms, 1920-1932.....	827-828	consumption, increase, rate and factors.....	127
income from, and value, 1930.....	782-783	cottage, industry, expansion. H. L. Wil-	
production value, 1930.....	782-783	son.....	137-138
shipments and slaughter, 1930.....	782-783	exports—	
slaughter in specified countries, 1921-1931.....	778	1899-1931.....	861
veal—		destination, 1927-1931.....	865
farm prices, 1922-1931.....	775	factories, improved methods, discussion by	
prices, market, 1922-1931.....	777, 778, 779, 782-783	Secretary.....	61-62
receipts at stockyards, 1922-1931.....	774-775	imports—	
slaughter under Federal inspection, 1922-		1899-1931.....	863
1931.....	779	origin, 1927-1931.....	873
See also Cattle.		production areas. W. J. Venske.....	124-127
Camera, motion-picture, time-lapse, aid to		receipts at markets, 1921-1931.....	843, 844
department's research. Raymond Evans.....	368-369	trade, international, 1925-1930.....	845
Camps, recreational, in national forests.		Cheeses, kinds and comparative value.....	138
F. V. Horton.....	121-122	Chemical utilization, farm by-products,	
Canned goods, tenderness tester for, aid in		prospects for. C. A. Browne.....	513-517
food law enforcement. W. B. White.....	366-368	Chemistry, research, discussion by Secretary.	73-77
Cantaloupes—		Cherries—	
acreage and production, 1928-1931.....	704	canned, exports, 1924-1931.....	706
car-lot shipments, 1920-1931.....	703	imports, 1924-1931.....	706
prices, farm, 1928-1931.....	704	production, 1924-1931.....	706
Copper-Ketcham Act, appropriation for ex-		Chestant—	
tension work.....	94	blight-resistant varieties, introduction from	
Carbon dioxide, vacuum method of offing		Asia.....	298-299
eggs, effect on keeping quality in storage.			
Lawrence H. James. and T. L. Swenson.....	184-185		

	Page		Page
Chestnut—Continued.		Color standards, for cotton, and effects of exposure.....	150-152
lands, planting to pine, value in Northeast.		Combine—	
Paul W. Stickle.....	127-128	development and use.....	445-446
Chick rations, value of alfalfa meals, experiments.	307-309	use on Great Plains.....	419
Burt W. Heywang.....	307-309	Cook, O. F.: Cotton Fiber Improvement	
Chicken lice, kinds and eradication.....	309-310	Necessitates Community Action to Keep	
Chickens—		Seed Pure.....	145-148
feeding alfalfa meals, experiments.....	307-309	Coors, G. H.: Sugar-beet Production is	
number and value, 1920-1931.....	846-848	Entering New Era as Disease Control	
prices, farm, 1910-1931.....	852	Gains.....	362-364
raising, large-scale, recommendations.....	310-312	Cooper, M. R.: Mechanization Slows as	
See also Hens; Poultry.		More Output and Less Demand Lower	
Chicks, leg weakness, prevention by attention		Prices. With C. L. Holmes.....	411-414
to feed. Harry W. Titus.....	128-129	Cooperation, necessity in production of pure	
Chittenden, E. F.: Dry Farming in Extensive		cotton seed.....	146-147
Operations Mainly Uses Crops of Low		Cooperative associations, assistance by Fed-	
Acres Value.....	174-176	eral intermediate banks.....	507
Children, clothes of, standards, relation to		Copra—	
comfort, simplicity, and self-help. Louise		imports, origin, 1927-1931.....	878
Stanley.....	568	trade, international, 1925-1930.....	885
China—		Corn—	
demand for United States products. Paul		acreage—	
O. Nyhus.....	129-134	1929 and 1919.....	484-485
silver, low exchange and buying power.....	138-134	and production, 1890-1931.....	608, 609, 612-613
Cigarettes—		uniformity, discussion by Secretary.....	14-15
consumption and demand in China.....	181-182	borer, control by machinery. R. B.	
consumption, relation to industrial activity,		Gray.....	426-428
1921-1930.....	208	canned, pack in United States, 1919-1931.....	711
Citrus—		cost of production by yield groups, 1930.....	897
fruit—		exports—	
coloring by ethylene process, recent im-		1890-1931.....	608, 862
provement. J. E. Winston.....	134-137	destination, 1927-1931.....	889
shipments by cooperative associations,		farm value, 1890-1931.....	608
1920-1931.....	950	futures trading, 1930-31.....	619-620
fruits—		growing, machinery, use and economy in	
by-products, value.....	518	labor.....	421
car-lot shipments, 1921-1931.....	707	imports, 1890-1931.....	608
production, 1899, 1909, 1919-1931.....	706	marketings by farmers, 1921-1931.....	615
growers, value of by-products market to,		pickers, operation and development.....	446
during overproduction. E. M. Chace. 517-518		prices—	
CLARK, NANCY GRIEWOLD: Pork Loins,		farm, 1890-1931.....	608, 616
When Seared, Shrink More in Weight		market, 1890-1932.....	608, 610, 618, 619
Though Cooking Faster.....	308-304	receipts—	
CLARKE, J. ALLEN: Wheats Bred for Smut		at markets, 1921-1931.....	615
Resistance Combined with Yield and Qual-		by grades, 1917-1931.....	615
ity.....	403-404	stocks in store, 1926-1931.....	616
Clarke-McNary law, cooperative agreement		sweet—	
for forest-fire protection. C. F. Evans.....	216-217	acreage and production, 1928-1931.....	710
Climate—		prices, farm, 1928-1931.....	710
arid, effect on loose-smut infection of wheat.		trade, international, 1925-1931.....	617
V. F. Tapke.....	397-398	utilization for grain, silage, etc., 1930-31.....	611
relation to dry-farming practices.....	177-178	visible supply, 1922-1932.....	616
Clothes, children's, standards, relation to		world production, 1900-1932.....	614
comfort, simplicity, and self-help. Louise		yields, 1890-1931.....	608, 610, 612-613
Stanley.....	568	Corn Belt, increase in output per man in all	
Clover—		phases of crop growing. Walter J.	
seed—		Roth.....	420-428
acreage, yield, and production, 1929-1931.	765	Cornstarch, exports, 1917-1931.....	862
imports, origin, 1927-1931.....	878-879	Cottage cheese, industry, expansion. H. L.	
prices, farm, 1929-1931.....	765, 767	Wilson.....	137-138
receipts at Chicago, 1922-1932.....	766	Cotton—	
sweet. See Sweetclover.		acreage—	
Clubs—		1929 and 1919.....	485-486
forestry 4-H, program in Central States.		abandoned, 1926-1931.....	669
R. A. Turner.....	230-231	harvested, 1866-1931.....	658-659, 660
4-H—		color effects of exposure.....	150-152
extension work in Hawaii.....	195-196	community interest in variety plan. H. G.	
forestry activities.....	230-231	McKeever.....	139-140
milk-quality improvement, campaign.....	191-192	comparison with burlap	
number and enrollment, 1925-1930.....	954	consumption and industrial production,	
Cocos—		graph, 1919-1931.....	203
imports—		cost of production by yield groups, 1930.....	899
1899-1931.....	863	domestic consumption, 1919-1931.....	606
origin, 1927-1931.....	874	driers, artificial, two types, description and	
Cocoon—		use.....	434-435
meat, imports, 1899-1931.....	864	drying, artificial, cost.....	435
oil—		exports—	
imports, 1909-1931.....	880	1849, 1859, 1866-1931.....	659-659
exports, 1920-1931.....	880	destination, 1927-1931.....	867
trade, international, 1925-1930.....	885	farm value, 1876-1931.....	658-659
Coffee—		farms, number and size, 1920 and 1930.....	498-491
imports—		fiber—	
1899-1931.....	863	improvement, necessity of community	
origin, 1927-1931.....	874	action. O. F. Cook.....	145-148
trade, international, 1925-1930.....	883	uniformity, need for and production.....	146-147
COLLINS, JOHN S.: Dry Farming Practices Deter-		grade lowering by exposure. Dorothy	
mined by Climatic and Soil Conditions.....	177-178	Nickerson.....	150-152
COLLINS, C. W.: Gipsy And Brown-tail Moth		growing, importance of fertilizer placement.	
Infestations Are Checked by Imported Pa-		J. J. Skinner.....	538-541
rasites. With T. H. Jones.....	236-239		

Cotton—Continued.	Page
imports, 1849, 1859, 1866-1931.....	658-659
lin—	
exports, 1899-1931.....	861
production, 1919-1931.....	860
world production, 1909-1932.....	661, 663-664
yields, world countries, 1909-1932.....	662
liners—	
export, destination, 1927-1931.....	867
production, 1919-1931.....	661
long-staple, production.....	143
marketings by farmers, 1921-1931.....	662
middling, spot prices, 1909-1932.....	667
mill consumption in world, foreign coun- tries, and United States, 1913-1931.....	665
one-variety plan, object and advantages.....	139-140
picking machine, need in South.....	431
premiums and discounts, 1924-1931.....	668-669
prices—	
at Liverpool, 1922-1932.....	670
farm, 1876-1931.....	658-659, 661, 670
per pound at New York, 1849-1931.....	658-659
production—	
1849-1931.....	658-659
in 1931.....	21
quality, effects of moisture in ginning pro- cess, F. L. Gerdes.....	431-433
raw, imports, origin, 1927-1931.....	875
root rot—	
control measures.....	155
damage in Southwest. C. J. King.....	152-155
fungus, activity, development, and con- trol.....	153-155
Russian, increase in acreage and output.....	
L. Volin.....	142-145
sea-land—	
advice to growers. C. B. Doyle.....	149-150
description, uses, and production.....	149-150
seed—	
drying, process and two types of driers.....	
Charles A. Bennett.....	433-435
moisture in ginning, effects on quality.....	
F. L. Gerdes.....	431-433
purity, maintenance by community ac- tion. O. F. Cook.....	145-149
spinning and demand in China.....	130-131
staple length, 1928-1931, data. W. B. Lan- ham.....	140-143
statistics.....	658-673
supply and distribution, 1913-1931.....	665
trade, international, 1925-1931.....	666
unmanufactured, imports, 1899-1931.....	863
utilization as new foundation material for making hooked rugs. Bess M. Vilemont.....	558- 560
varieties, improvement, discussion by Sec- retary.....	63
world—	
acreage, 1909-1932.....	662
situation, discussion by Secretary.....	25-27
yields, 1866-1931.....	658-659, 661
Cottonseed—	
cake—	
and meal, exports, 1899-1931.....	861
range supplement in cattle feeding.....	105
meal—	
exports, destination, 1927-1931.....	871
prices, 1931.....	673
oil—	
exports, 1909-1931.....	880
exports, destination, 1927-1931.....	872
prices, 1922-1932.....	672, 673
solvent for paradiolchlorobenzene in control of lesser peach borer.....	265-266
trade, international, 1925-1930.....	671
prices, farm, 1922-1932.....	671, 672
production, 1909-1931.....	671, 672
products, production, 1909-1931.....	672
COUCH, JAMES F.: Dogs and Cats May be Kept off Flower Beds by Nicotine Sul- phate.....	169-170
Cowpeas—	
acreage and production, 1930-1931.....	750
farm value, 1930-1931.....	750
prices—	
farm, 1930-1931.....	750
market, 1922-1931.....	751
yields, 1930-1931.....	750
Cows—	
beef, herd management for profit. E. W. McComas.....	106-107

Cows—Continued.	Page
dairy—	
feeding, economy in apportionment of grain. J. B. SHEPHERD.....	154-161
output, effect of sires from proved sires.....	156-158
output, value due to dairy herd-improve- ment associations.....	162-164
See also Bulls, dairy; Cattle, dairy; Cows, milk.	
milk—	
numbers and value, 1850, 1860, 1867- 1931.....	825-826
prices, farm, 1922-1931.....	830
See also Cattle.	
COX, JOHN H.: Wheat's Deterioration in Farm Storage Bin Tested Experimentally.....	404-406
Cranberries—	
prices, farm, 1926-1931.....	711
production, 1926-1931.....	711
Cream—	
imports—	
1912-1931.....	864
quality, improvement due to Federal law. H. B. Switzer.....	272-273
receipts at markets by States, 1930-1931.....	873
whipping requirements as to temperature and age. C. J. Babcock.....	155-156
Credit—	
corporations, opportunities, discussion by Secretary.....	45-46
facilities, intermediate, capacity for expan- sion. Norman J. Wall and Fred L. Garlock.....	505-507
farm—	
facilities, discussion by Secretary.....	43-46
importance of merchant accounts.....	503-505
sources, shift since 1920.....	502
use.....	501-512
Federal intermediate, loans and discount rate, 1917-1931.....	913
international effect upon decline of ex- ports, discussion by Secretary.....	5-6
mortgage, use, study of long-term factors re- quired. David L. Wickens.....	509-512
short-term, restriction to productive uses. Fred L. Garlock.....	507-509
See also Loans; Mortgages.	
Crop—	
acreage, extensive regional shifts, census report. O. E. Baker.....	479-483
acresages, regional shifts, 1919-1929. Joseph A. Becker.....	484-487
area, 1930, comparison with farm size and number, 1920. Howard A. Turner.....	487-491
land—	
area, relation to cultivable acreage of United States. C. P. Barnes and F. J. Marschner.....	470-474
increases, location.....	490-493
production—	
1931, discussion by Secretary.....	19-23
adjustments by farmers, discussion by Secretary.....	13-19
increase, factors affecting.....	464-466
Crops—	
acreage, 1929-1931.....	886-887, 888
dry-land, production, values.....	174-176
farm value, 1924-1931.....	888-891
miscellaneous, statistics.....	744-769
production and yield, 1929-1931.....	886-887
Cucumbers—	
acreage and production, 1928-1931.....	711
prices, farm, 1929-1931.....	711
cultivators, new types, description and use.....	443-445
CUMINGS, G. A.: Tillage Implements of New Types and Designs Used in Modern Farm- ing.....	441-445
Currents, imports, origin, 1927-1931.....	875
DALRY, ALAN: Radio Correlation Arranged by Federal and State Agencies.....	315-316
Dairy—	
cattle. See Bulls, dairy. Cattle, dairy.	
cows. See Cows, dairy.	
farms, uses of electricity.....	452
herd-improvement associations—	
completion of twenty-five years' work. J. E. Dorman.....	161-163
purpose and origin.....	161-162
records regarding output per cow. J. C. McDowell.....	163-164

	Page		Page
Dairy—Continued.		EDWARDS, EVELLETT E.: Farmers' Account	
products—		Books, Diaries, etc., are Often Valuable	
marketing associations, number and esti-		Research Aids.....	197-200
mated business, 1925-1926, 1928-1930.....	950	Egg—	
quantity produced, 1923-1930.....	831-832	albumen, imports—	
regions, mechanization, increase. Emil		1921-1931.....	864
Rauchenstein and T. D. Johnson.....	423-425	origin, 1927-1931.....	873
research, progress.....	60-63	hatching, prevention by certain bone de-	
situation, discussion by Secretary.....	31-32	fects of developing embryo. Theodore	
statistics.....	825-846	C. Byerly.....	181-182
Danubian States, grain exports business.....	214-215	products, trade, international, 1925-1930.....	855
DARROW, GEORGE M.—		yolks, imports—	
Berry Breeders Seek New Varieties Adapted		1912-1931.....	864
to Specific Purposes. With George F.		origin, 1927-1931.....	878
Waldo.....	113-114	Eggs—	
Strawberry-Bud Formation is Favorably		annual layings per flock, 1925-1931.....	849
Influenced by Temperature and Light.		cold-storage holdings, 1922-1931.....	854
With George F. Waldo.....	355-359	exports, 1899-1931.....	861
Date industry, production of new noncom-		imports—	
petitive crop. Walter T. Swingle.....	165-167	1912-1931.....	864
Dates—		origin, 1927-1931.....	873
imports, origin, 1927-1931.....	875	in storage, oiling by vacuum carbon diox-	
introduction, culture, and imports.....	165-167	ide method. Lawrence H. James and	
ripening, effect of special kinds of pollen.		T. L. Swenson.....	184-185
Roy W. Nixon.....	164-169	oiling by vacuum carbon dioxide method,	
DAVIS, E. W.: Beet Leaf Hoppers' Origin		effect on keeping quality in storage.	
Important in Control and in Prediction of		Lawrence H. James and T. L. Swenson.....	184-185
Attack. With P. N. Annand.....	110-113	prices—	
DAVIS, R. O. E.: Fertilizer Industry Making		at five markets, 1910-1931.....	856
Adjustments to Complex Economic Re-		farm, 1910-1931.....	857
quirements.....	529-533	receipts at markets, 1927-1931.....	853-854
Depots, fruit and vegetable, use in distribu-		size and numbers, increase by methodical	
tion in big city markets. Wendell Cal-		breeding. J. P. Quinn.....	182-184
houn.....	233-236	trade, international, 1925-1930.....	855
Dextrase, status under food and drugs act.....	88	Electricity—	
DIERL, H. C.: Freezing to Preserve Vege-		application to farm machinery in foreign	
tables and Fruits Still in Pioneer Stage.....	524-527	countries.....	455
Diet, low-cost, aid by division of food dollar.		new uses on the farm. S. H. McCrory.....	449-453
Hazel K. Stiebeling.....	553-556	use in farm activities, aid by State experi-	
Dipping—		ment stations.....	353
cattle, by means of octagonal vat, advan-		Electrification, rural, development with	
tages.....	122-124	new uses. S. H. McCrory.....	449-453
poultry, for eradication of lice.....	310	ELLIS, N. R.: Pigs Produce Pork More	
Dogs, repelling from flower beds by use of		Efficiently on Limited Feed Levels.	
nicotinesulphate. James F. Couch.....	169-170	With J. H. Zeller.....	291-292
DORMAN, J. E.: Dairy Herd-Improvement		Elm disease, Dutch, spread in this country,	
Associations Complete Twenty-Five Years'		survey. R. Kent Beattie.....	178-181
Work.....	161-163	Elms, susceptibility to Dutch elm disease.....	178-181
DOWNNEY, K. MELVINA: Laundry Tests under		Engineering, agricultural, useful work of	
Scientific Control Show How to Prevent		State experiment stations. Robert W.	
Damage.....	569-572	Trullinger.....	351-353
DOYLE, C. B.: Cotton Growers Advised Not		FNLOW, C. R.: Pasture Lands of U. S. Vary Regionally	
to Try Large-Scale Planting of Sea-Island.....	148-150	in Main Characteristics. With H. N.	
Drainage, in humid areas, provision by		Vinnal.....	280-284
trenches. S. W. Greene.....	378-381	Pastures Should Supply a Larger Pro-	
Driers, cotton, two types, construction and		portion of Feed Used by Livestock.	
use.....	434-435	With A. T. Semple.....	284-287
Drought—		Enteritis, necrotic, of swine, mineral mix-	
effect on strawberry-bud formation.....	357	tures for, misrepresentations.....	274
losses of 1930 and 1931, data. Joseph A.		Ergot—	
Recker.....	170-173	importations, testing for quality and	
relief, discussion by Secretary.....	46-49	purity by U. S. officials. W. T. Mc-	
Dry farming—		Cluskey.....	185-187
extensive operations, use of crops of low		sources and uses.....	185-187
acre value. E. F. Chilcott.....	174-176	Erosion—	
Pacific Northwest, grain and clean fallow		control—	
as basis. D. E. Stephens.....	176-177	by forestry. J. D. Sinclair.....	226-228
pasture requirements. J. T. Sarvis.....	173-174	success on ranges in southeast Oregon.	
practices, determination by climatic and		W. L. Dutton.....	187-190
soil conditions. John S. Cole.....	177-178	effect on crop acreage.....	466-467
Drugs, seizures under food and drugs act.....	89	problems, discussion by Secretary.....	77
Dutch elm disease, spread in this country,		soil—	
survey. R. Kent Beattie.....	173-181	control, national program.....	349-351
DUTTON, W. L.: Erosion Control Proves		control variation with types of precipita-	
Successful on Ranges in Southeast Oregon.....	187-189	tion and soil.....	346-348
Earthworms—		damage factors.....	346
consumption by swine, cause of lungworm		problem, investigation in national control	
infestation. Benjamin Schwartz.....	344-346	program. H. H. Bennett.....	344-351
intermediate hosts of swine lungworms.....	345-346	See also Land, eroded.	
Eastern States, conditions for Japanese		Ethylene process, improved, citrus-fruit	
beetle. C. H. Hadley.....	254-260	coloring. J. R. Winston.....	134-137
EATON, O. N.: Inbreeding Experiments with		European corn borer. See Corn borer.	
Guinea Pig as a Guide in Stock Breeding.....	251-254	Eutettix tenellus. See Sugar-beet leaf hopper.	
EDINGER, A. T.: Meat Prices at Retail Follow		EVANS, C. F.: Forest-Fire Protection by	
the Trend of the Livestock Market.....	267-270	Cooperative Agreement under the Clarke-	
EDMONSTER, LYNN RAMSEY: Foreign Coun-		McNary Law.....	216-217
tries Adopt Variety of Subsidy Plans for		EVANS, OSCAR: Big Trees, Relic of an Ancient	
Agricultural Relief.....	213-215	Flora, Now Found Only in Sierra Nevada.	
			115-116

	Page		Page
EVANS, R. M.: Forestry is Reclaiming Cut-over Charcoal Lands in Southern Appalachians.....	228-230	Farm—Continued.	
EVANS, RAYMOND: Time-Lapse Motion-Picture Camera Helps Department's Research.....	368-369	products—Continued.	
Ewes, culling on basis of dryness unjustifiable.....	338-339	new uses for.....	513-528
Experiment stations, State, useful work in agricultural engineering. Robert W. Trullinger.....	351-353	supply and demand, effect of mechanization on. Oris V. Wells.....	415-417
Exploration, agricultural, results in introduction of new species and varieties.....	297-302	returns, 1922-1930.....	894-895
Exports—		tenancy, increase, 1920-1930. O. M. Johnson.....	491-495
agricultural products, discussion by Secretary.....	34-35	value. See under <i>specific crop</i> , farm value.	
farm products, discussion by Secretary.....	2-9	women—	
See also <i>under specific crops</i> .		influence of home-demonstration work on, survey. M. C. Wilson.....	248-249
Extension—		use of home accounts. Mary Rokahr.....	244-246
activities and accomplishments, 1925-1930. records, use in showing improved practices pay in poultry profits. H. L. Shrader.....	189-190	woodlands, importance as factor in timber survey. C. M. Granger.....	409-410
work—		workers, gainfully employed, numbers, decrease. Josiah C. Folsom.....	459-499
in Hawaii, problems. William A. Lloyd.....	192-196	Farmers—	
projects and time consumed, 1925-1930.....	953	account books and diaries, aid to research. Everett E. Edwards.....	197-200
workers, cooperative, number, 1930-1931.....	952	bankruptcies, 1910-1931.....	906
Extension Service, work, review by Secretary.....	92-94	indebtedness, estimation at 13 to 14 millions. Norman J. Wall.....	501-503
Fabrics, quality and utilization, studies.....	86	Farms—	
Families—		Corn-Belt, change of size due to increasing mechanization.....	422
assistance in wise spending by home economics research.....	552-553	corporate and family-sized, discussion by Secretary.....	18-19
farm—		eroded and terraced, requirements in special machinery. Claude K. Shedd.....	446-449
effect of drought upon.....	47-48	number—	
living standards, investigations.....	86	1920, 1925, 1930.....	908-911
resources, development by assistance of home-demonstration agents. Ola Powell Malcolm.....	246-248	and size, 1930, comparison with 1920. Howard A. Turner.....	487-491
food expenditures.....	554-555	ownership changes, 1928-1931.....	905
Family living standards, dependence on use and size of income. Faith M. Williams.....	549-551	terraced and eroded, requirements in special machinery. Claude K. Shedd.....	446-449
FARR, J. A.: Wheat in U. S. Attacked by Three Smuts, Two of Them Widely Distributed.....	394-397	unproductive, withdrawal from cultivation.....	459-460
Farm—		Federal—	
area, present trends not indicative of increase. O. E. Baker.....	462-467	aid projects, employment statistics, discussion by Secretary.....	52
buildings, repainting before wood weathering. F. L. Browne.....	196-197	land banks.....	
business and related statistics.....	886-913	bond yields, 1917-1931.....	913
butchering, demonstration in Texas counties.....	556-558	rates to borrower, 1917-1931.....	913
by-products, prospects for chemical utilization. C. A. Browne.....	513-517	reserve banks, discount rates, 1917-1931.....	913
commodities, surplus, discussion by Secretary.....	7-9, 10	Federal Farm Board—	
credit, use.....	501-512	aid to farmers.....	25
data, 1930 census.....	479-499	stabilization activities.....	90-91
families, living standards, investigations.....	86	Federal Farm Loan Board, administration of funds.....	45
finance, merchant credit in, importance and effect on farmer. David L. Wickens and Burton D. Seeley.....	503-505	Feed—	
home practices, influence by extension workers.....	249	costs, dairy cows, and returns per dollar.....	163-164
implement companies, extension of farm credit.....	506-507	crops—	
land, value per acre in 1930. B. R. Stauber.....	474-478	damage by drought.....	171-173
living standards.....	549-558	production in 1931.....	21-22
mechanization.....	411-455	pigs, effect of limited quantity on pork production. N. R. Ellis and J. H. Zeller.....	291-292
mortgage debt, estimation, 1910-1930.....	912	Feeding—	
operations, adaptability of tractor, recent progress. R. B. Gray.....	437-441	alfalfa meals to chickens, experiments....	307-309
physical condition, remediable, restriction of use of machines. George R. Boyd.....	435-437	beef cattle—	
population, decrease, 1920-1930. C. J. Galpin.....	495-497	economy in, recommendations.....	106-107
prices. See <i>Prices</i> , farm; See also <i>under specific crop</i> , farm prices.		in Great Plains on winter range.....	104-106
production—		in Texas, survey.....	102-103
income, cash, 1924-1930.....	889-891	economical measures, recommendations.....	106-107
income, gross, 1924-1930.....	889-893	dairy cows, economy in apportionment of grain. J. B. Shepherd.....	158-161
value of capital, 1909-1931.....	893	Fertilizer—	
products—		combination, superphosphate and free ammonia, successful process. Wm. H. Ross and K. D. Jacob.....	535-537
consumption, 1897-1930.....	463	consumption, 1920-1931.....	943-944
exports, discussion by Secretary.....	2-9	developments.....	529-548
exports, trend, 1900-1930.....	463-464	elements, secondary, requirement of to hacco soils. J. E. McMurtrey, jr.....	545-548
		experiments, phosphate requirements in Middle West. Oswald Schreiner.....	542-545
		imports and exports, 1926-1930.....	944
		industry, adjustments to economic requirements. R. O. E. Davis.....	529-533
		materials—	
		imports and exports, 1926-1930.....	944
		production, 1926-1930.....	942, 944
		sales and value, 1928-1930.....	942
		sources and composition.....	530
		placement, importance in cotton-growing States. J. J. Skinner.....	538-541

	Page		Page
Fertilizer—Continued.		Food and Drug Administration, work, review by Secretary	87-90
production, 1926-1930	942, 944	Foods—	
sales and value, 1928-1930	942	canned, use of tenderness tester on	366-368
sources, Midwest, concentration, effect on cost. J. W. Turrentine	538-535	testing for Government requirements	211-212
Fertilizers—		vitamin content, measurement by tests with rats. Hazel E. Munsell	506-567
essential elements, research work	75-76	Forage—	
use in growing tobacco	370-371	crops, value in dry-land farming	175-176
Fiber—		location for traveler in national forests	216
from flax, world production, 1921-1932	642	plant seeds, imports, 1921-1931	769
plant, introduction by plant explorer	302	Foreign—	
Fibers—		market, effect upon American agriculture, discussion by Secretary	1-3
animal, imports, origin, 1927-1931	873-874	trade. See Exports; Imports; and under specific product, trade, international.	
vegetable, imports, origin, 1927-1931	875	Forest—	
See also under specific names.		administration, need for correlation of grazing and recreation. J. W. Nelson	215-216
Figs—		fire—	
imports, origin, 1927-1931	875	areas, mapping, value	219, 220
prices, farm, 1922-1931	712	equipment, use in California	221
production and value, 1922-1931	712	protection, cooperative agreement under the Clarke-McNary law. O. F. Evans	210-217
Filberts, imports, origin, 1927-1931	877	protection, need for detailed planning of transportation system. T. W. Norcross	218-220
Fire control, motorization in Lake States and forest-land area. Crosby A. Hoar	205-206	fires—	
Flax—		control by agreement under Clarke-McNary law	216-217
acreage and production, 1921-1932	642-643	control by planning of transportation system	218-220
fiber production, world countries, 1921-1932	642	control measures	205-206
imports, origin, 1927-1931	875	fighting with water in California. Walter E. Jotter	220-222
production in 1931	22	management, cut-over land, aim at uniform annual yield. Quincy Randles	222
world production, 1920-1932	641	products—	
See also Flaxseed.		exports and imports, value, 1928-1931	859
Flaxseed—		selected, exports and imports, 1909-1931	860
acreage and production, 1909-1932, 639-640, 642, 643		ranges. See Ranges.	
brushels crushed, 1919-1931	640	restoration, on eastern national forests, complications. L. S. Gross	223-226
cake, exports, destination, 1927-1932	371	trees, seed-extraction plant, work	313
exports, 1909-1930	640	Forestry—	
farm value, 1909-1931	640	aid to farmer in controlling erosion. J. D. Sinclair	226-228
imports—		demonstration, benefit to turpentine operators. Joseph C. Kircher	385-386
1899-1931	640, 864	4-H clubs, program in Central States. R. A. Turner	230-231
origin, 1927-1931	578	practices on national preserves	222-223
marketings by farmers, 1921-1931	641	promotion, cooperation of States	81-82
prices—		reclamation of cut-over charcoal lands in southern Appalachians. R. M. Evans	228-230
at Minneapolis, 1899-1932	646	research, discussion by Secretary	77-82
farm, 1909-1932	640, 645	Forests—	
receipts at Minneapolis, 1909-1932	644	fire problem and amount of damage	78-79
stocks—		national—	
in store, 1926-1931	644	camp for recreation. F. V. Horton	121-122
supply, net, 1909-1931	640	eastern, forest restoration, complications. L. S. Gross	223-226
trade, international, 1925-1930	645	extension and consolidation	79-80
yields, 1919-1931	640	improvements, appropriations for	78
See also Flax.		receipts, and timber-sale policy	81
Flies, aid to surgeons in combating a persistent bone disease of man. F. C. Bishopp	206-210	roads, construction, development of trail builder. Fred E. Thleme	376-377
Flor., H. H.: Wheat Bred to Resist Some Strains of Bunt May Succumb to Others	392-393	work in, as aid to unemployment	50-51
Flour—		planting stock, handling and care	224-226
rice, imports, origin, 1927-1931	876	resources, use, effect on recreational use. Dana Parkinson	222-223
wheat—		Foster, M. T.: Lamb Grading at Point of Origin Compensates Producer for Quality	264
exports, destination, 1927-1931	871	Fowls—	
imports, origin, 1927-1931	877	bone defects, cause of non-hatching of eggs	181-182
prices, wholesale, 1922-1932	596	susceptibility to tuberculosis	381-383
Flower beds, protection from dogs and cats by use of nicotine sulphate. James F. Couch	169-170	Freezing, fruits and vegetables, for preservation, status. H. C. Diehl	524-537
Flowers, foreign varieties, introduction by explorers	299, 302	Frost, killing dates, with length of growing season	918-919
Folsom, JOSHUA C.: Workers Gainfully Employed in Farming Decrease in Recent Years	498-501	Fruit—	
Food—		and nut production, dependence on amount of foliage on trees. J. R. Magnus	231-233
and drugs—		and vegetable situation, discussion by Secretary	33-34
act's requirements, application to U. S. Government's buying. Summer C. Rowe	210-212	diseases, fluctuation and need of prompt action	294-297
act, prosecutions and seizures	87, 88		
composition data, aid to research workers in interpreting food standards. Charlotte Chatfield	565		
dollar, division into five parts for safeguarding low-cost diet. Hazel K. Stiebeling	553-556		
law enforcement, aid by tenderness tester for canned goods. W. B. White	366-368		
prices, wholesale, 1919-1931, graph	203		
quality studies, guide to producers. Florence B. King	560-562		
selection and purchase by U. S. Government	210-212		
standards, interpretation by food-composition data, research work. Charlotte Chatfield	563		

Fruit—Continued.	Page
fly, Mediterranean, control measures.....	69-70
growing, relation to beekeeping, study on Pacific coast.....	101-102
moth, oriental, control by parasites. H. W. Allen.....	277-278
preservation by freezing, problems for research. Robert P. Straka.....	527-528
trees, foliage, importance.....	231-233
Fruits—	
and vegetables—	
distribution by depots in big city markets. Wendell Calhoun.....	233-236
freezing for preservation, status. H. C. Diehl.....	524-527
canned, grading service, official, inauguration. Paul M. Williams.....	274-275
citrus. See Citrus fruits.	
exports, destination, 1927-1931.....	867-869
foreign varieties, introduction by explorers. 298, 299, 300-301, 302	
fresh and dried, exports, increase.....	35-36
imports, origin, 1927-1931.....	875-876
production in 1931.....	22-23
statistics.....	695-743
unloads at markets, 1924-1931.....	742-743
Fumigants, development and use.....	73-74
Fumigation, peas, for destruction of pea weevils, recommendations.....	238-239
Fungicides—	
imports and exports, 1926-1930.....	945
prices at New York, 1910-1931.....	945
production, 1926-1930.....	945
Furfural, production from farm wastes, industrial uses. H. T. Harlick.....	520
Fusarium conglutinans, cause of cabbage yellows, and control.....	119-121
Futures trading, grain, discussion by Secretary.....	90-92
GABRIELSON, IRA N.: Rodent-Control Studies Develop Specific Methods for the Different Species.....	325-328
GALPIN, C. J.: Farm Population in Decade 1920-1930 Shows a Considerable Decrease.....	495-497
Gams—	
on national forests, regulation.....	223
See also Wild fowl; Wild life.	
GARLOCK, FRED L.: Intermediate Credit Facilities Capable of Substantial Expansion. With Norman J. Wall.....	505-507
Short-Term Credit Is Best Restricted to Productive Uses.....	507-509
GARNER, W. W.: Tobacco Culture Needs Improvement in Methods of Growing and Curing.....	870-871
Gasoline taxes, 1930.....	941
GERDES, F. L.: Cotton Quality Affected in Ginning Process by Moisture in Seed Cotton.....	431-433
Gipsy—	
and brown-tail moth infestations, check by imported parasites. O. W. Collins and T. H. Jones.....	236-239
moth—	
control measures.....	240-242
control work, discussion by Secretary.....	72
eradication project, success in New Jersey. A. F. Burgess.....	239-244
Glucose, exports, 1899-1931.....	862
Goats, numbers clipped and average clip, 1920-1931.....	813
Goatskins, imports, 1899-1931.....	863
GORESLINE, HARRY E.: Turnips Converted into Appetizing Sauerkraut in the Same Way as Cabbage.....	383-384
Grading—	
lambs, at point of origin. M. T. Foster.....	284
service for canned fruit and vegetables, official, inauguration. Paul M. Williams.....	274-275
Grain—	
apportionment, in economical feeding of dairy cows. J. B. Shepherd.....	152-151
crops, in Pacific Northwest, value in dry farming.....	176-177
exchanges, abuses, need of reformation.....	91-92
futures, trading, discussion by Secretary.....	90-92
products, exports, destination, 1927-1931.....	869-871
statistics.....	877-887
Grain Stabilization Corporation, activities, discussion by Secretary.....	90-91

Grains—	Page
exports, destination, 1927-1931.....	869-871
imports, origin, 1927-1931.....	876-877
small, growing in Corn Belt, economy in labor due to machines.....	421
See also under specific names.	
GRANGER, C. M.: Woodlands on Farm an Important Factor in Timber Survey.....	400-410
Grapefruit—	
coloring by improved ethylene process.....	135-137
exports—	
1922-1931.....	862
destination, 1927-1931.....	869
prices, auction, 1924-1932.....	708
See also Citrus fruit.	
Grapes—	
car-lot shipments, 1920-1931.....	713
exports, 1921-1932.....	712, 852
imports, 1922-1931.....	712
prices—	
farm, 1922-1931.....	712, 714-715
market, 1926-1931.....	713, 718
production, 1922-1931.....	712, 714-715
Graphium ulmi, cause of Dutch elm disease.....	178-179
Grasses, tame, use in pasture improvement.....	281
Grasshopper outbreaks, control measures.....	67-68
GRAY, L. C.: Land-Utilization Problem, Intensified by Depression, Demands National Policy.....	457-460
National Conference Recommends Program of Study and Action.....	460-462
GRAY, R. B.: American Machinery Is Influencing Agriculture Greatly in Other Lands.....	453-455
Machinery Is the Best Means Yet Found for Controlling Corn Borer.....	426-428
Tractor's Adaptation to Varied Farm Operations Rapid in Recent Years.....	437-441
Grazing—	
Hohenheim system, description and advantages.....	285-286
needs, national forests, correlation with recreation needs. J. W. Nelson.....	215-216
requirements of dry farming.....	173-174
Great Plains—	
northern, beef cattle, wintering on range. A. L. Baker.....	103-106
region, mechanization, progress. L. A. Reynolds.....	417-420
valleys, vegetable growing in, favorable conditions. M. F. Babb.....	387-389
GREENE, S. W.: Trench Silos, Provided With Drainage, Are a Success in Humid Areas.....	878-881
GROSS, L. S.: Forest Restoration a Complicated Job on the Eastern National Forests.....	223-226
Guinea pigs, inbreeding as guide in stock breeding experiments. O. N. Eaton.....	251-254
Gullying, cause and damage.....	345-346
Gums, imports, 1899-1931.....	863
HADLEY, O. H.: Japanese Beetle Has Found Conditions in Eastern States Ideal.....	254-260
HALLSTED, A. L.: Wheat Growers in Central Great Plains Use Three Main Tillage Methods.....	393-394
Hams, exports, destination, 1927-1931.....	866
HANKINS, O. G.: Beef Helfers Compare Favorably with Steers in Meat Experiments.....	107-110
HARROWS, new types, description and use.....	442-443
HARTER, L. L.: Snap-Bean Seed Grown in West Is Relatively Free of Blight and Anthracnose.....	341
HARMAN, W. A.: Need of Better Directed Land Settlement Shown by Mistakes of the Past.....	487-470
Harvester—	
cotton, development, types, and use.....	446
thresher, development and use.....	445-446
windrow, use.....	445
Harvesting machinery, development of some types. W. M. Huser.....	445-446
HASKELL, R. J.: Stinking-Smut Control through Seed Treatment Urged by Extension Men.....	354-357
Hawaii, extension work, problems. William A. Lloyd.....	192-196
Hay—	
acreage and yields, 1919-1931.....	753, 754-755
exports, 1919-1931.....	753

Hay—Continued.	Page	Home—Continued.	Page
imports, 1919-1931.....	753	makers—Continued.	
prices—		farm duties.....	562-564
farm, 1919-1931.....	753, 757	leisure, studies for light on living stand-	
market, 1921-1931.....	758	ards. Hildegard Kneeland.....	562-564
production, 1919-1931.....	753, 754-755, 756	Home Economics, Bureau of, work, review by	
receipts at markets, 1924-1931.....	752	Secretary.....	88-96
Hefers—		Honey—	
beef, comparison with steers, experiments.		grading—	
O. G. Hankins.....	107-110	recommendations.....	251
number on farms, 1920-1932.....	826-828	stamps, value to consumer of product.	
value per head, 1928-1932.....	826-827	George E. Marvin.....	249-251
Hemenquén—		prices, farm, 1921-1930.....	685
imports—		Honeybees. See Beekeeping; Bees.	
1899-1931.....	504	Hops—	
origin, 1927-1931.....	575	acreage and production, 1922-1932.....	760
Hens, laying houses, multiple-story, use and		exports—	
management.....	311-312	1899-1932.....	760, 862
Herding, sheep, bedding-out and old sys-		destination, 1927-1931.....	871
tems, comparison.....	335-337	imports, 1922-1932.....	760
HERNDON, C. A.: Radio Preferences of Farm-		prices, farm, 1922-1932.....	760
ers Indicated by Sixteen Test Programs.....	316-317	trade, international, 1925-1930.....	761
HERBICK, H. T.: Furfural, a Product Of		yields, 1922-1932.....	760
Farm Wastes, Has Many Industrial Uses.	520	Horses—	
HERWANG, BURT W.: Poultry Experiments		decrease on Corn Belt farms.....	421-422
Show Value of Alfalfa Meals in Chick Ra-		farm value, 1910-1932.....	818, 819
tion.....	307-309	numbers, 1910-1932.....	818, 819-821
Hides—		prices, farm, 1922-1931.....	818
cattle, imports, 1899-1931.....	863	statistics.....	818-821
prices at Chicago, 1922-1931.....	817	HORTON, F. V.: Camps in the National For-	
policy.....	322-323	ests Attract Farm Folk Seeking Recrea-	
Highways—		tion.....	121-122
Federal-aid—		HOWARD, NEALE F.: Mexican Bean Beetle	
construction as aid to unemployment.....	49-	Approaches Northern Limits of Distribu-	
labor rates, 1922-1931.....	50, 52-55	tion.....	270-271
mileage and apportionment, 1917-1933.....	942	Hunters' licenses, returns by States, 1929-1930.	829
mileage and apportionment, 1917-1933.....	932	HURST, W. M.: Some Types of Harvesting	
forest, mileage and appropriations, 1931.....	54-55	Machinery Reach High State of Develop-	
State—		ment.....	445-446
income and funds available, 1930.....	934	HYDE, Secretary: World Influences upon	
mileage, 1930.....	933	American Agriculture.....	1-98
See also Roads.		Imports—	
HILLMAN, F. H.: Seed-Testing Service Pro-		agricultural products, discussion by Secre-	
tects Farmer in Case of Many Principal		tary.....	85-86
Crops. With E. Brown and E. H. Toole.	333-335	milk and cream, quality, improvement due	
HINES, R. L.: Wiltshire Sides for Export		to Federal law. H. B. Switzer.....	272-273
Should Meet English Requirements.....	406-409	See also Foreign trade. See also under spec-	
HOAR, CROSBY A.: Fire Control Motorized		ific crop.	
in the Lake States Forest-Land Area.....	205-206	Inbreeding, guinea pigs, guide in stock breed-	
Hoe, rotary, description and use.....	443-444	ing, experiments. O. N. Eaton.....	251-254
Hogs—		Income—	
cholera-control work, 1918-1930.....	794	family, wise use of, assistance by home eco-	
feeding on pasture, recommendations.....	286	nomics research.....	552-553
income from, and value, 1930.....	795	farm—	
killing, cutting, and curing, demonstra-		1930, comparison with 1929.....	11-12
tions.....	556-557	and outgo, disparity.....	205
live weight at Chicago, 1922-1932.....	788	gross and cash, 1924-1930.....	889-893
necrotic enteritis, mineral mixtures for,		relation to price decline, discussion by	
misrepresentations.....	274	Secretary.....	10-13
number, 1840, 1850, 1860, 1867-1932.....	784-787	gross, from farm products, 1930 and other	
prices—		years.....	47
and demand, discussion by Secretary.....	29-30	use and size, relation to family living stand-	
farm, 1922-1932.....	788	ards. Faith M. Williams.....	549-551
market, 1901-1931.....	789, 790	Incomes—	
production value, 1930.....	795	and prices, farm, reflection of business and	
receipts at stockyards, 1922-1931.....	787-788	financial conditions. L. H. Bean.....	200-205
shipments and slaughter, 1930.....	795	farm, declines, 1930-1932.....	201-205
slaughter—		Index numbers—	
in specified countries, 1921-1931.....	791	agricultural exports, 1909-1931.....	880
under Federal inspection, 1922-1931.....	789	farm—	
statistics.....	783-795	prices, 1910-1930.....	900-902
value, 1840, 1850, 1860, 1867-1932.....	784-785	real estate, 1912-1931.....	904
See also Pigs; Swine.		wages, 1910-1931.....	902, 903
HOLMES, C. L.: Mechanization Slows as More		volume of agricultural production, 1919-	
Output and Less Demand Lower Prices.		1931.....	887
With M. R. Cooper.....	411-414	Information work, review by Secretary.....	94-95
Home—		Insect pests—	
demonstration—		conditions, discussion by Secretary.....	66-71
agents, assistance in developing farm fam-		destruction by birds.....	116-117
ily resources. Ola Powell Malcolm.....	246-248	Insecticides—	
work, influence on farm women, survey.		arsenical, residue problem, discussion by	
M. C. Wilson.....	245-249	Secretary.....	70
economics research, assistance to home		development and use.....	73-74
makers in wise spending. Louise		imports and exports, 1926-1930.....	945
Stanley.....	552-553	prices at New York, 1919-1931.....	945
makers—		production, 1926-1930.....	945
assistance in wise spending by home eco-		Insular experiment stations, progress, review	
nomics research. Louise Stanley.....	552-553	by Secretary.....	97-98

	Page		Page
JACOB, K. D.: Fertilizer Combining Super-phosphate with Free Ammonia Succeeds. With Wm. H. Ross.....	535-537	Land—Continued.	
JAMES, LAWRENCE H.: Eggs Oiled by Vacuum Carbon Dioxide Method Keep Better in Storage. With T. L. Swenson.....	184-185	settlement, past mistakes, and need of better direction. W. A. Hartman.....	467-470
conditions for, in Eastern States. C. H. Hadley.....	254-260	use problem.....	460, 471
control measures.....	69, 259-260	utilization—	457-475
distribution, 1931.....	255-256	changes due to depression.....	457-475
JOHNSON, O. M.: Farm Tenancy Increased from 33.1 Per Cent of all Farms in 1920 to 42.4 Per Cent in 1930.....	491-495	discussion by Secretary.....	37-40
JOHNSON, T. D.: Mechanization in Dairy Regions Increasing Fast, Investment Data Show. With Emil Rauchenstein.....	423-425	need of national policy. L. C. Gray.....	457-460
JONES, JOHN H.: Beef-Cattle Finishing by Supplementing Pasture Is Increasing in Texas.....	102-103	Land Utilization, National Conference on recommendations. L. C. Gray.....	460-462
JONES, T. H.: Gipsy and Brown-Tail Moth Infestations are Checked by Imported Parasites. With C. W. Collins.....	236-239	Lands—	
JOTTE, WALTER E.: Forest Fires Are Often Fought with Water in California.....	220-222	chestnut, planting to pine, value. Paul W. Stickel.....	127-128
Juices, fruit. See Fruit juices.		eroded by soil run-off, reclamation.....	343-350
Jute—		farm, damage by sediments from erosion.....	345-346
butts, unmanufactured, imports, 1890-1931.....	864	LANHAM, W. B.: Cotton Data Record Variation in Staple Length, 1928-1931.....	140-142
unmanufactured, imports, 1890-1931.....	864	Lard—	
Kafr, prices at Kansas City, 1921-1932.....	657	exports—	
KING, C. J.: Cotton Root Rot Causes Great loss in Southwest; Cotton Problem Unsolved.....	152-155	1890-1931.....	861
KING, FLORENCE B.: Food-Quality Studies Elicit Facts that Serve as Guide to Producers.....	560-562	destination, 1927-1931.....	866-867
KIRCHER, JOSEPH C.: Turpentine Operators to Have Benefit of Forestry Demonstration.....	385-386	prices, market, 1921-1931.....	793-794
KNEELAND, HILDEGARDE.: Leisure of Home Makers Studied for Light on Standards of Living.....	562-564	production and consumption, 1900-1930.....	817
Knutson-Vandenberg Act, aid to reforestation work in Lake States. H. Basil Wales.....	317-320	stocks on hand, 1922-1931.....	791
Labor—		trade, international, 1925-1930.....	793
farm, by geographic divisions, 1931.....	904	LARSON, A. O.: Pea-Weevil Damage Can be Decreased by Certain Farm Practices.....	287-290
rates, Federal-aid highway projects, 1922-1931.....	942	LAST, ELMER: Tuberculosis Becomes a Serious Menace to the Poultry Industry.....	381-383
Lake States, reforestation work, aid of Knutson-Vandenberg Act. H. Basil Wales.....	317-320	Laundry—	
Lamb—		damage prevention, tests under scientific control. K. Melvina Downey.....	569-572
cold-storage holdings, 1922-1931.....	804	scorching, prevention.....	570-571
demonstrations, effect on home meat supply.....	557-558	LEE, ALFRED R.: Poultry Raising on a Very Intensive Scale Is Proving Practical.....	310-312
prices—		Leg weakness, of chicks, prevention by attention to feed. Harry W. Titus.....	128-129
retail, effect of livestock market trend, study.....	268-270	Legumes, foreign varieties, introduction by explorers.....	298, 300
wholesale, 1920-1931.....	816	Lemons—	
ripening by storage period, effect on tenderness. K. F. Warner and Lucy M. Alexander.....	260-263	by-products, importance.....	517-518
storage, effect on tenderness.....	260-263	imports, 1890-1931.....	863
trade, international, 1925-1930.....	804	imports, origin, 1927-1931.....	876
See also Meat; Mutton.		prices, auction, 1924-1932.....	708
Lans—		trade, international, 1925-1930.....	708
grading at point of origin. M. T. Foster.....	264	See also Citrus fruits.	
herding, "blanket" system, advantages.....	336-337	Lepidoptera seed—	
income from and value, 1930.....	805-806	acreage, yield, and production, 1929-1931.....	766
numbers, 1840, 1850, 1860, 1867-1932.....	796-797	prices, farm, 1929-1931.....	
prices—		Lettuce—	
farm, 1922-1932.....	801	acreage and production, 1928-1931.....	717
market, 1901-1931.....	802-803	car-lot shipments, 1920-1931.....	716
production value, 1930.....	805-806	culture in Colorado.....	387-388
shipments and slaughter, 1930.....	805-806	prices, farm, 1928-1931.....	717
slaughter under Federal inspection, 1922-1931.....	804	LECKEL, R. W.: Wheat Loss from Stinking Smut Can Be Reduced by Disinfecting the Seed.....	398-401
value, 1840, 1850, 1860, 1867-1932.....	796-797	Lice—	
See also Sheep.		chicken, kinds and eradication.....	309-310
Land—		poultry, losses preventable. F. O. Bishop.....	309-310
eroded—		Light and temperature, influence on strawberry-bud formation. George F. Waldo and George M. Darrow.....	857-859
cultivation problems.....	447-449	Lignin—	
requirements in special machinery.....	446-449	manufacture from farm wastes, and market possibilities.....	515-516
farm, values, discussion by Secretary.....	40-42	possible source of cheap organic chemicals. Max Phillips.....	519
policy, adjustment, discussion by Secretary.....	37-40	Limes. See Citrus fruits.	
selling companies, inducements to prospective purchasers.....	468-470	Linseed—	
		cake—	
		and meal, exports, 1890-1931.....	861
		exports, destination, 1927-1931.....	871
		meal, prices, wholesale, at Minneapolis, 1922-1932.....	648
		oil—	
		production, 1919-1931.....	646
		prices at New York, 1922-1932.....	647
		trade, international, 1925-1930.....	647
		Lint, cotton. See Cotton lint.	
		Liverpool, prices of cotton, 1922-1932.....	670
		Livestock—	
		cooperative marketing, 1918-1931.....	951
		diseases and parasites, remedies, misbranding.....	273-274



	Page		Page
Milk—Continued.		NORCROSS, T. W.: Forest-Fire Protection In-	
cows. <i>See</i> Cattle, dairy; Cows, dairy; Cows,		volves Detailed Planning of Transporta-	
milk.		tion System.....	218-220
evaporated—		Nut—	
exports, destination, 1927-1931.....	865	and fruit production, dependence on	
trade, international, 1925-1930.....	834	amount of foliage on trees. J. R. Mag-	
exports, 1899-1931.....	861	ness.....	231-233
fruit, receipts at markets, by States, 1930-		trees, foliage, importance.....	231-233
1931.....	833	Nuts, imports, origin, 1927-1931.....	877-878
import act, Federal, effect on quality of		NYHUS, PAUL O.: China's Demand Large for	
milk and cream imports.....	272-273	Some U. S. Products, Despite Low In-	
imports—		comes.....	129-134
1918-1931.....	864	Oatmeal, exports, destination, 1927-1931.....	870
quality improvement due to Federal		Oats—	
law. H. B. Switzer.....	272-273	acreage, 1929 and 1919.....	498
output, effect of sires from proved sires.....	156-158	acreage and production, 1900-1931.....	620-621, 624-625
prices—		cost of production by yield groups, 1930.....	868
farm, 1923-1931.....	834-835	exports—	
retail, 1931.....	835	1890-1931.....	620, 862
production—		destination, 1927-1931.....	869
by States, 1925-1931.....	829	farm value, 1900-1931.....	620
cost, and value per cow, 1930.....	830	imports, 1900-1931.....	620
due to dairy herd-improvement associa-		marketings by farmers, 1921-1931.....	626
tions.....	163-164	prices—	
quality, in cooperative program, empha-		farm, 1900-1931.....	620, 629
sized by extension services. Joseph B.		market, 1900-1931.....	620, 622, 629
Parker.....	190-192	receipts—	
MILLER, RAY: Logs from the Wood Lot May		at markets, 1921-1931.....	626
Be Sold Profitably on a Log-Grade Basis. 256-267		by grades, 1919-1931.....	626
Mineral mixtures for livestock, misbranding.		stocks in store, 1926-1931.....	627
H. E. Moskey.....	273-274	trade, international, 1925-1931.....	628
Mohair—		visible supply, 1922-1932.....	627
imports—		world production, 1894-1932.....	623
1922-1931.....	864	yields, 1900-1931.....	620, 622, 624-625
origin, 1927-1931.....	874	Oil—	
production, 1920-1931.....	813	cake—	
Molasses—		exports, destination, 1927-1931.....	871
imports, 1899-1931.....	864	meal, exports, destination, 1927-1931.....	871
production in Louisiana, 1911-1931.....	877	meal, trade, international, 1925-1930.....	881
Mortgage—		trade, international, 1925-1930.....	881
credit, use, study of long-term factors re-		coconut. <i>See</i> Coconut oil.	
quired. David L. Wickens.....	500-512	cottonseed. <i>See</i> Cottonseed oil.	
farm, debt estimation, 1910-1930.....	912	flaxseed. <i>See</i> Linseed oil.	
MOSKEY, H. E.: Mineral Mixtures for Live-		linseed. <i>See</i> Linseed oil.	
stock Misbranded if Claims Are Exces-		peanut. <i>See</i> Peanut oil.	
sive.....	273-274	Oils, vegetable—	
Motion-picture camera, time-lapse, aid to de-		exports—	
partment's research. Raymond Evans.....	388-389	1909-1931.....	880
Motor vehicles—		destination, 1927-1931.....	872
registration, 1930.....	939	imports—	
revenues, 1930.....	940	1909-1931.....	880
Mules—		origin, 1927-1931.....	878
farm value, 1910-1932.....	818, 822	Oilseeds, imports, origin, 1927-1931.....	878
numbers, 1910-1932.....	818, 822-823	Oleo oil, exports—	
prices, farm, 1926-1931.....	818	1890-1931.....	861
statistics.....	818, 822-823	destination, 1927-1931.....	867
MUNSELL, HAZEL E.: Vitamin Content of		Oleomargarine—	
Many Foods Measured by Tests with		manufacture, materials used.....	846
Rats.....	566-567	prices, wholesale, 1922-1931.....	845
Musk oxen, reintroduction into Alaska.....	84	production and consumption, 1924-1931.....	846
Mutton—		Olive oil—	
cold-storage holdings, 1922-1931.....	804	imports, origin, 1927-1931.....	878
prices, wholesale, 1929-1931.....	816	trade, international, 1925-1930.....	718
trade, international, 1925-1930.....	804	Olives—	
National Advisory Loan Committee, admin-		imports—	
istration of funds.....	45	1899-1931.....	863
NELSON, J. W.: Forest Administration Must		origin, 1927-1931.....	876
Correlate Grazing and Recreation Needs. 215-216		prices, farm, 1922-1931.....	717
Nematode, alfalfa-stem, cause of severe dam-		production and value, 1922-1931.....	717
age in western areas. Gerald Thorne.....	99-101	Onions—	
New Jersey, gipsy-moth eradication project,		acreage and production, 1928-1931.....	719
success. A. F. Burgess.....	239-244	car-load shipments, 1920-1931.....	720
NICKERSON, DOROTHY: Cotton Progressively		imports, 1899-1931.....	863, 719
Lowered in Grade by Exposure, Tests		prices, farm, 1928-1931.....	719
Show.....	150-152	Oranges—	
Nicotine sulphate, use to keep dogs and cats		coloring by improved ethylene process.....	135-137
off flower beds. James F. Couch.....	169-170	exports—	
Nitrogen—		1890-1931.....	861
fixation, research, effect on fertilizer in-		destination, 1927-1931.....	869
dustry.....	530	prices, auction, 1924-1932.....	709-710
use in growing tobacco.....	370-371	refrigeration in ocean transport, recom-	
world production, 1927-1931.....	944	mendations. W. R. Barger.....	276-277
NIXON, ROY W.: Date Ripening Controlled		trade, international, 1925-1930.....	709
Beneficially by Using Special Kinds of		<i>See also</i> Citrus fruits.	
Pollen.....	169-169	Orchards, pollinating agents, package bees as,	
NOLAN, W. J.: Package Bees May Be Used as		use. W. J. Nolan.....	279-280
Pollinating Agents in Orchards.....	279-280		

	Page		Page
Osceola National Forest, acquisition by Government.....	385-386	Peas—	
Osteomyelitis, treatment, use of blow flies.....	206-210	acreage—	
		and production, 1922-1931.....	725
Pacific coast, bee-culture research. E. L. Sechrist.....	101-102	yield and production, 1929-1931.....	765
PAINE, H. S.: Sweetpotatoes Yield Fine White Starch by a New Process. With R. T. Balch.....	522-524	canned, pack in United States, 1918-1931.....	726
Palm oil, imports, 1909-1931.....	880	car-lot shipments, 1925-1931.....	725
Paper—		culture in Colorado.....	388-389
consumption by kinds.....	926	harvesting, time and method for control of pea weevil.....	287-288
production, 1909, 1919, 1929, 1930.....	925	prices, farm, 1928-1931.....	725
Paradichlorobenzene, effectiveness in cottonseed oil against lesser peach borer. Oliver I. Snapp.....	265-266	seed, culture in Wyoming.....	389
Parnassia—		Pecan trees, number by States and age groups, 1929.....	726
animal, eradication progress.....	59	Pecans, production and prices, 1927-1931.....	737
improved, use in checking gypsy and brown-tail moth infestations. C. W. Collins and T. H. Jones.....	230-239	Pepper, imports, origin, 1927-1931.....	879
Japanese beetle, success.....	259	Perishable commodities act—	
of oriental fruit moth, occurrence and distribution.....	277-278	promotion of prompt settlement of disputes. H. A. Spillman.....	290-291
PARKER, JOSEPH B.: Extension Service Emphasize Milk Quality in Cooperative Program.....	190-192	violations, discussion by Secretary.....	55
PARKINSON, DANA: Forest Resources Can Be Wisely Used without Hampering Recreation.....	222-223	Perishables, refrigeration methods, experiments.....	65-66
Pasture—		Perosis, nutritional, of chicks, symptoms and remedy.....	128-129
condition, first of month, 1909-1931.....	758-759	PHILLIPS, M. V.: Lignin, Farm By-Product, Now Wasted, May Supply Cheap Organic Chemicals.....	519
improvement by use of tame grasses.....	281, 283	Phosphate requirements, fertilizer experiments in Middle West. Oswald Schreiner.....	542-545
lands—		Pigs—	
carrying capacity, by regions.....	282-284	feed, limited, results in efficient pork production. N. R. Ellis and J. H. Zeller.....	291-292
characteristics, regional. H. N. Vinal and C. R. Enlow.....	280-284	numbers and value, 1928-1932.....	785
supplement for finishing beef cattle, increase in Texas. John H. Jones.....	102-103	See also Hogs; Swine.	
Pastures—		Pine—	
improvement and utilization by livestock. A. T. Semple and C. R. Enlow.....	284-287	planting on chestnut lands in Northeast. Paul W. Stickel.....	127-128
requirements in dry farming. J. T. Sarvis.....	173-174	seedlings, response to sunlight in growth and density. Hardy J. Shirley.....	292-294
Pea—		Pineapples, canned, exports, 1922-1931.....	862
weevil, damage decrease by farm practices. A. O. Larson.....	287-290	Plant—	
weevils, hibernation and destruction.....	289	disease hazards, fluctuation and requirements in prompt action. Nell E. Stevens.....	294-297
Peach—		diseases, control investigations.....	65
borer—		exploration, results in introduction of new species and varieties. Knowles A. Ryerson.....	297-302
lesser, food plants, habits, and injury.....	265	industry, progress.....	63-66
lesser, killing by paradichlorobenzene in cottonseed oil. Oliver I. Snapp.....	265-266	quarantines, progress, discussion by Secretary.....	71-72
brown rot, fluctuations and need of prompt action.....	294-295, 297	Plowing, clean, for corn-borer control, recommendations.....	426-427
orchards, infestation by oriental fruit moth and control.....	277-278	Plows, new types, description and use.....	441-442
Peaches—		Plums—	
canned, exports, 1922-1931.....	862	prices, farm, 1926-1931.....	727
car-lot shipments, 1921-1931.....	722	production, 1928-1931.....	727
exports, 1913-1931.....	720	Poisons, for rodents, study.....	325-328
prices, farm, 1913-1931.....	720-721	POLHAMUS, LOREN G.: Rubber Plant Hybrids of Madagascar Species Prove Vigorous in U. S.....	329-331
production, 1913-1931.....	720-721	Pollen, date, effect of special kinds on ripening of fruit. Roy W. Nixon.....	168-169
FRYCKE, W. M.: Seed-Corn Maggot Injury Avoided by Suberizing Potato Seed Pieces before planting. With W. J. Reid, Jr., and R. C. Wright.....	331-333	Pollination—	
Peanut oil—		differential, of dates, effect on ripening of fruit.....	168-169
prices, market, 1922-1932.....	765	orchards, by means of package bees. W. J. Nolan.....	279-280
production, 1919-1931.....	764	Population—	
trade, international, 1925-1930.....	764	changes, discussion by Secretary.....	36-37
Peanuts—		farm—	
acreage, yield, and production, 1919-1931.....	761, 763	1790-1930.....	907
imports, origin, 1927-1931.....	877	decrease, 1920-1930. C. J. Galpin.....	495-497
prices—		increase, 1921-1931.....	462-463
farm, 1919-1931.....	761, 762-763	Pork—	
market, 1930-31.....	763	exports—	
shelled, imports, 1899-1931.....	864	1899-1931.....	861
trade, international, 1925-1930.....	762	destination, 1927-1931.....	866
Pears—		English requirements.....	406-409
canned, exports, 1922-1931.....	862	lean, produced by high and low feed levels, comparison.....	292
car-lot shipments, 1921-1931.....	723	loins, searing, advantages. Nancy Griswold Clark.....	303-304
exports, 1913-1931.....	723	prices, wholesale, 1929-1931.....	816
fresh, exports, 1922-1931.....	862	production by limited feed, test. N. R. Ellis and J. R. Zeller.....	291-292
prices, farm, 1913-1931.....	723, 724	products—	
production, 1913-1931.....	723, 724	exports, 1899-1931.....	861
		trade, international, 1925-1930.....	792

Pork—Continued.	Page	Prices—Continued.	Page
stocks on hand, 1922-1931.....	791	apples, 1919-1931.....	695, 699
trade, international, 1925-1930.....	792	apricots, 1922-1931.....	699
<i>See also Meats.</i>		asparagus, 1925-1931.....	700
FORTE, WILLIAM S.: Tomato Variety Called		barley, 1900-1931.....	630, 632, 637, 639
Break o' Day Succeeds in Far Scattered		beans, dry edible, 1914-1931.....	744, 746
Tests.....	373-376	bran, 1922-1932.....	597
Potash deposits—		bread, 1922-1932.....	596
extraction, studies of experiments. P. H.		broomcorn, 1915-1931.....	751-752
Royset.....	537-538	buckwheat, 1919-1932.....	654, 655
in Wyoming.....	535, 538	butter, 1910-1931.....	840-841
Potato—		butterfat, 1922-1931.....	835
diseases—		cabbage, 1928-1931.....	701-702
fluctuation and need of prompt action. 295-296,	297	calves, 1909-1931.....	775, 777, 778, 779, 782-783
tuber-borne, elimination by tuber-index		cantaloupes, 1929-1931.....	704
method of seed selection.....	304-306	carrots, 1928-1931.....	704
seed—		cattle, 1909-1931.....	775, 776-777, 778, 779, 782-783
pieces, suberization, for control of injury		celery, 1928-1931.....	705
from seed-corn maggot. W. J. Reid,		cheese, 1924-1931.....	644
Jr., W. M. Peacock, and R. C.		chickens, 1910-1931.....	852
Wright.....	331-333	clover seed, 1929-1931.....	765, 767
selection, tuber-index method. William		corn, 1890-1932.....	604, 610, 616, 618, 619
Stuart.....	304-306	cotton, 1849-1931.....	658-659, 661, 667, 670
Potatoes—		cottonseed—	
acreage and production, 1909-1931.....	728,	meal, 1931.....	673
729, 731, 732		oil, 1922-1932.....	672-673
car-lot shipments, 1921-1931.....	728	cowpeas, 1922-1931.....	750-751
culture in Wyoming.....	389	cows, milk, to producers, 1922-1931.....	830
disease-resistant varieties, introduction		cranberries, 1926-1931.....	711
from Mexico.....	301-302	cucumbers, 1925-1931.....	711
exports, 1909-1931.....	728	eggs, 1910-1931.....	856-857
farm value, 1909-1931.....	728	farm—	
imports, 1909-1931.....	728	and incomes, reflection of business and	
injury by seed-corn maggot, avoidance be-		financial conditions. L. H. Bean.....	200-205
fore planting. W. J. Reid, Jr., W. M.		drop, effect on adoption and use of ma-	
Peacock, and R. C. Wright.....	331-333	chinery.....	413-414
prices—		index numbers, 1910-1930.....	900-902
farm, 1909-1931.....	728, 730, 732, 733	relation to decline in net income, discus-	
market, 1909-1931.....	728, 734	sion by Secretary.....	10-13
production and storage methods, effect on		<i>See also under specific crop, farm</i>	
cookery.....	561-562	prices.	
source of starch.....	523	figs, 1922-1931.....	712
trade, international, 1925-1930.....	733	flaxseed, 1899-1932.....	640, 645-646
yields, 1909-1931.....	728, 730, 731	flour—	
POTTS, C. G.: Sheep Improvement through		1922-1932.....	596
Breeding Is Demonstrated by U. S. Shrop-		middlings, 1922-1932.....	597
shire Flock.....	339-341	grapefruit, 1924-1932.....	708
Poultry—		grapes, 1922-1931.....	712, 713, 714-715, 716
breeding for increased egg size and numbers.		hay, 1919-1931.....	753, 757, 758
J. P. Quinn.....	182-184	hides, 1922-1931.....	817
dressed, receipts at markets, 1921-1931.....	850-851	hogs, 1901-1931.....	788, 789, 790
farms, uses of electricity.....	452	honey, 1921-1930.....	685
feeding, value of alfalfa meals, experiments.		hops, 1922-1932.....	790
Burt W. Heywang.....	307-309	horses, 1922-1932.....	718
frozen, cold-storage holdings, 1922-1931.....	852	kafir, 1921-1932.....	637
industry—		lambs, 1901-1931.....	801-803
loss caused by non-hatching of eggs.....	181	lard, 1921-1931.....	793-794
menace by tuberculosis. Elmer Lash.....	381-383	lemons, 1924-1932.....	708
profits, result of improved practices.....	189-190	lespedeza seed, 1929-1931.....	766
lice, losses preventable. F. C. Bishopp.....	309-310	lettuce, 1928-1931.....	717
live, freight receipts, 1927-1931.....	850	linseed—	
profits, improved practices, effect as shown		meal, at Minneapolis, 1922-1932.....	648
in extension records. H. L. Shrader.....	189-190	oil, at New York, 1922-1932.....	647
raising, large-scale, practicality. Alfred		livestock—	
R. Lee.....	310-312	decline, discussion by Secretary.....	28-29
situation, discussion by Secretary.....	82-83	reflection in retail meat market.....	287-270
statistics.....	846-857	maple sugar and sirup, 1917-1931.....	694
<i>See also Chickens; Turkeys.</i>		meat, retail, reflection of livestock market	
Precipitation—		trend. A. T. Edinger.....	267-270
selected points, by months, 1931.....	916-917	meats, 1929-1931.....	816
<i>See also Rainfall.</i>		milk, 1922-1931.....	834-835
Precooling, oranges for export.....	276, 277	mules, 1926-1931.....	818
Predatory-animal control work, 10-year		oats, 1900-1931.....	620, 622, 629
program (with rodents). Stanley P.		oleomargarine, 1922-1931.....	845
Young.....	312-315	olive, 1922-1931.....	717
Preservation—		onions, 1928-1931.....	719
fruit, by freezing, problems for research.		oranges, 1924-1932.....	709-710
Robert F. Straka.....	527-528	peaches, 1913-1931.....	720-721
fruits and vegetables, by freezing, status.		peanut oil, 1922-1932.....	765
H. C. Diehl.....	524-527	peanuts.....	761, 762-763
Press associations, spread of agricultural		pears, 1913-1931.....	723, 724
information.....	95	peas, 1928-1931.....	725
Prices—		pecans, 1927-1931.....	727
alfalfa—		plums, 1926-1931.....	727
meal, 1922-1932.....	758	potatoes, 1909-1931.....	728, 730, 732, 733, 734
seed, 1922-1932.....	766, 767	prunes, 1926-1931.....	727
almonds, 1922-1931.....	695	rice, 1909-1932.....	648, 652
and incomes, farm, reflection of business		rye, 1909-1931.....	599, 601, 606, 607
and financial conditions. L. H. Bean.....	200-205	seeds, 1922-1931.....	768-769
		sheep, 1912-1932.....	801-803

	Page		Page
Prices—Continued.		Refrigeration—	
sorghums, 1919-1931.....	656	oranges, in ocean transports, recommenda-	
sorgo sirup, 1928-1931.....	683	tions. W. R. Barger.....	276-277
soybean oil, 1923-1931.....	749	perishables, methods, experiments.....	65-66
soybeans, 1922-1932.....	747, 748-749	Refuges, bird, on the farm, value and require-	
spinach, 1923-1931.....	737	ments. W. L. McAtee.....	116-118
strawberries, 1923-1931.....	737	Regional shifts—	
sugar, 1923-1931.....	681, 683	crop acreage, census report O. E. Baker.....	479-
sugar beets, 1911-1931.....	674	crop acreages, 1919-1929. Joseph A.	
sugarcane sirup, 1928-1931.....	683	Becker.....	484-487
sweet corn, 1923-1931.....	710	REID, W. J., JR.: Seed-Corn Maggot Injury	
sweetclover seed, 1929.....	766	Avoided by Suberizing Potato Seed Pieces	
sweetpotatoes, 1919-1931.....	735, 736	Before Planting. With W. M. Peacock	
timothy seed, 1923-1931.....	767, 768	and R. C. Wright.....	331-333
tobacco, 1890-1931.....	686, 687, 690-692	Relief, agricultural, economic importance.....	212-215
tomatoes, 1923-1931.....	739	Research—	
turkeys, 1912-1931.....	852	bee-culture, inauguration on Pacific coast.	
velvetbeans, 1923-1931.....	751	E. L. Sechrist.....	101-102
walnuts, 1922-1931.....	741	farm, value of account books and diaries.....	197-200
watermelons, 1923-1931.....	741	REYNOLDS, L. A.—	
wheat, 1896-1932.....	577-578, 583, 591, 593-595	Mechanization Has Made Greatest Pro-	
wool, 1922-1931.....	811-812	gress in the Great Plains Region.....	417-420
Production costs, reduction methods, discus-	13	Mechanization in South Has Been Re-	
sion by Secretary.....	513-528	tarded by Lack of a Cotton Picking Ma-	
Products, farm, new uses for.....	513-528	chine. With B. E. Thiodeaux.....	428-431
Prunes—		Rice—	
exports—		acreage and production, 1909-1932.....	643, 649, 650-651
1899-1931.....	861	exports—	
destination, 1927-1931.....	868	1899-1931.....	643, 862
prices, farm 1923-1931.....	727	destination, 1927-1931.....	870
production, 1923-1931.....	727	farm value, 1909-1931.....	648
Public—		imports—	
domain, policy changes recommended.....	460	1909-1931.....	648
health, protection by food and drugs act.....	88	origin, 1927-1931.....	876
Pulpwood consumption, 1909, 1919, 1929,		prices—	
1930.....	925-926	farm, 1909-1931.....	643, 652
Purchasing associations, membership and		wholesale, at New Orleans, 1922-1932.....	652
amount of business, 1930-31.....	946-949	receipts at mills, 1922-1931.....	652
QUINN, J. P.: Egg Size and Numbers Can Be		trade, international, 1923-1930.....	653
Increased by Methodical Breeding.....	182-184	varieties, differences in cooking qualities.....	660-661
Radio—		world production, 1909-1932.....	649
broadcasting correlation, arrangement by		yields, 1909-1932.....	643, 650-652
Federal and State agencies. Alan Daily.....	315-	Rickets, of chicks, cause, symptoms, and	
316		remedy.....	128
preferences of farmers, indication by sixteen		Road—	
test programs. C. A. Herndon.....	316-317	building—	
service, expansion, review by Secretary.....	95	need of engineering supervision.....	325
Rainfall—		on secondary or local projects, progress.	
annual, by States, 1881-1930.....	920-922	Thomas H. MacDonald.....	321, 325
low, problem on plains.....	471-472	construction—	
Raisins—		economy.....	326
exports, 1899-1931.....	861	emergency, 1931.....	930-931
exports, destination, 1927-1931.....	868	county and local, mileage, 1930.....	936
Raking, clean, for corn-borer control.....	427-428	farm, snow removal, simple equipment.	
RANDLES, QUINCY: Forest Management of		H. G. McKelvey.....	342-344
Cut-over Land Aims at Uniform Yield		Federal-aid—	
Annually.....	225	construction, 1931.....	930-931
Range wintering, beef cattle, in northern		construction, progress.....	52-55
Great Plains. A. L. Baker.....	103-106	local—	
Ranges, in southeastern Oregon, success of		disbursements, 1930.....	938
erosion control on. W. L. Dutton.....	187-189	income and funds available, 1930.....	937
Rations, cows, dairy, economy in apportion-		national forest, construction, use of trail	
ment of grain.....	158-161	builder. Fred E. Thieme.....	376-377
Rate, control in Hawaii, campaign.....	193-194	State, disbursements, 1930.....	935
Rats, tests on, for measurement of vitamin		See also Highways.	
content of foods. Hazel E. Munsell.....	566-567	Rodent control work, 10-year program (with	
RAUCHENSTEIN, EMIL: Mechanization in		predatory animal). Stanley P. Young.....	312-315
Dairy Regions Increasing Fast, Investment		Rodents, control studies, results in specific	
Date Show. With T. D. Johnson.....	423-425	methods for different species. Ira N. Ga-	
Rayon yarn, production, imports and price,		brrielson.....	325-328
1921-1931.....	954	ROKABE, MARY: Home Accounting Makes	
Real estate, farm—		Good Headway among Farm Women.....	244-246
tax per acre, 1924-1930.....	903	Rosin—	
index numbers, 1912-1931.....	904	and turpentine, essentials for numerous	
value per acre in 1930. B. R. Stauber.....	474-478	industries. F. P. Veitch and W. O.	
values, discussion by Secretary.....	41-42	Smith.....	384-385
Reclamation policy, changes recommended.....	480	consumption, 1923-1930.....	928
Recreation—		Rosins, uses in industry.....	385
camp for farm folk in national forests.		ROSS, WM. H.: Fertilizer Combining Super-	
F. V. Horton.....	121-122	phosphate with Free Ammonia Succeeds.	
national forests, relation to use of forest		With K. D. Jacob.....	535-537
resources. Dana Parkinson.....	222-223	ROTH, WALTER J.: Corn Belt Increasing Its	
needs, national forests, correlation with		Output per Man in All Phases of Crop	
grazing needs. J. W. Nelson.....	215-216	Growing.....	420-423
Reforestation in Lake States, aid by Knut-		Roughage, feeding, economy for dairy cows.....	161
son-Vandenberg Act. H. Basil Wales.....	317-320		

	Page
ROWE, SUMNER C.: Food and Drugs Act's Requirements Apply to U. S. Government's Buying.....	210-212
ROYSTER, P. H.: Potash Extraction from United States Deposits Studied in Promising Experiments.....	537-538
Rubber—	
imports, 1899-1931.....	863
India, imports, origin, 1927-1931.....	579
plant hybrids of Madagascas species, vigor in U. S. Loren G. Polhamus.....	329-331
plants, two species from Madagascar, introduction and comparison.....	329-330
trade, international, 1925-1930.....	382
Rugs, hooked, making, utilization of cotton as new foundation material. Bess M. Vismont.....	553-560
Russia—	
cotton, increase in acreage and output. L. Volin.....	142-143
importation and consumption of American cotton.....	142, 143
Rye—	
acreage and production, 1909-1931.....	599-600, 602-603
exports—	
1899-1931.....	599, 862
destination, 1927-1931.....	870
farm value, 1909-1931.....	599
imports, 1909-1931.....	599
marketing by farmers, 1921-1931.....	605
prices—	
farm, 1909-1931.....	599, 606
market, 1909-1931.....	599, 601, 607
receipts—	
at markets, 1921-1931.....	605
by grades, 1921-1931.....	605
stocks in store, 1926-1931.....	606
trade, international, 1927-1931.....	607
world production, 1894-1932.....	604
yields, 1909-1931.....	599, 601-603
RYERSON, KNOWLES A.: Plant Explorers Bring Valuable New Species and Varieties to U. S.....	297-302
SARVIS, J. T.: Dry Farming Calls for Native Pastures as an Important Adjunct.....	173-174
Sauerkraut, preparation from turnips, method, description.....	383-384
Sausage casings, imports, origin, 1927-1931.....	874
SCHREINER, OSWALD: Fertilizer Experiments Show Phosphate is Chief Need in the Middle West.....	542-545
SCHWARTZ, BENJAMIN: Swine Take Lung-worms into Their Bodies by Consuming Earthworms.....	364-366
Searing pork loins, advantages. Nancy Griswold Clark.....	303-304
SECHRIST, E. L.: Bee Culture Research Recently Inaugurated on the Pacific Coast.....	101-102
Seed—	
corn maggot, injury to potatoes, and control. W. J. Reid, Jr., W. M. Peacock, and R. C. Wright.....	331-333
labels, misleading, intentional.....	333-334
testing service, protection of farmer. E. Brown, F. H. Hillman, and E. H. Toole.....	333-335
wheat—	
disinfection, for reduction of loss from stinkingsmut. R. W. Leukel.....	398-401
treatment for control of stinking smut, work of extension men. R. J. Haskell.....	354-357
Seeds—	
forage plant, imports, 1921-1931.....	769
imports, origin, 1927-1931.....	878-879
misbranding, prohibition by Federal seed act.....	835
prices, market, 1922-1931.....	768-769
SEELY, BURTON D.: Merchant Credit Important in Farm Finance, but May Help or Harm the Farmer. With David L. Wickens.....	503-505
SEMPLE, A. T.: Pastures Should Supply a Larger Proportion of Feed Used by Livestock. With C. R. Enlow.....	284-287
Sequoias, relics of ancient forests, found in Sierra Nevada.....	115-116
SHEED, CLAUDE K.: Eroded and Terraced Farms Require Special Methods and Machinery.....	446-449

	Page
Sheep—	
bedding-out system, advantages. Glen A. Smith.....	335-337
culling on basis of dryness unjustifiable. John A. Stoehr.....	338-339
income from and value, 1930.....	805-806
numbers, 1940, 1950, 1960, 1967-1932.....	796-799
prices—	
and slaughtering, discussion by Secretary.....	30
farm, 1912-1932.....	801
market, 1901-1931.....	802-803
production value, 1930.....	805-806
receipts at stockyards, 1922-1931.....	800
shipments and slaughter, 1930.....	805-806
Shropshire, improvement through breeding. C. G. Potts.....	339-341
slaughter under Federal inspection, 1922-1931.....	804
statistics.....	796-812
value, 1840, 1870, 1880, 1867-1932.....	796-797
See also Lambs.	
Shellac, imports, 1909-1931.....	860
SHEPHERD, J. B.: Dairy Cows Fed More Economically if Grain Is Properly Apportioned.....	153-161
SHIRLEY, HARDY L.: Pine Seedlings Show Response to Sunlight in Growth and Density.....	292-294
Shoulders, exports, destination, 1927-1931.....	866
SHEADE, H. L.: Extension Records Show that Improved Practices Pay in Poultry Profits.....	189-190
Silk—	
imports, 1899-1931.....	863
raw, imports—	
and price, 1921-1931.....	954
origin, 1927-1931.....	873
Silos, trench, with drainage provisions, success in humid areas. S. W. Greene.....	378-381
SINCLAIR, J. D.: Forestry is an Aid to the Farmer in Controlling Erosion.....	226-228
Strap—	
maple—	
prices, 1924-1931.....	664
production, 1917-1931.....	664
sorgo, acreage, production, and price, by States, 1923-1931.....	683
sugarcane, acreage, production, and price, 1923-1931.....	683
Sisal, imports—	
1899-1931.....	864
origin, 1927-1931.....	875
SKINNER, J. J.: Fertilizer Placement of Vast Importance in Cotton-Growing States.....	538-541
Skins, imports, 1899-1931.....	863
SKUDERNA, A. W.: Sugar-Beet Production Costs Reduced by New Cross-Cultivation Method.....	359-362
SMITH, GLEN A.: Sheep Are Handled Advantageously under the Bedding-Out System.....	335-337
SMITH, W. C.: Turpentine and Rosin Supply Essentials for Numerous Industries. With F. P. Veitch.....	384-385
Smith-Lever Appropriation Acts, appropriations for extension work.....	94
Smut—	
flag—	
on wheat, annual loss, survey.....	396-397
wheat strains resistant to as means of control. V. F. Tapke.....	401-403
loose, of wheat—	
annual loss, survey.....	396
prevention by arid climate. V. F. Tapke.....	397-398
resistance, breeding wheats for, and combining yield and quality. J. Allen Clark.....	403-404
stinking—	
control through seed treatment, work of extension men. R. J. Haskell.....	354-357
of wheat, loss reduction by disinfecting seed. R. W. Leukel.....	398-401
on wheat, survey.....	394-396
wheat—	
infection and control studies.....	397-398
See also Bunt.	
Smuts, three, on wheat, distribution. J. A. Faris.....	394-397

	Page		Page
Snap-bean seed, western, freedom from blight and anthracnose. L. L. Harter	341	STIEBELING, HAZEL K.: Dividing the Food Dollar into Five Parts Helps to Safeguard Low-Cost Diet	553-556
SNAPP, OLIVER L.: Lesser Peach Borer Killed with Paradiichlorobenzene Dissolved in Cottonseed Oil	265-266	Stock. See Livestock.	
Snow—		Stocks on farms. See under <i>specific crop</i> , stocks on farms.	
drifts, causes, removal	343	STOEHR, JOHN A.: Sheep Culling Largely on the Basis of Dryness is Seldom Justifiable	338-339
fences, construction and placing	343-344	Storage—	
removal on farm roads, simple equipment.	342-344	butler, in 1-pound prints, keeping value.	
H. G. McKelvey	342-344	William White	118-119
Snowplow, types and use on farm roads	342	eggs, preservation by vacuum carbon dioxide method. Lawrence H. James and T. L. Swenson	184-185
SNYDER, ROY W.: Meat Demonstrations Increase Interest in Supplying Home Needs	554-558	lamb, effect on tenderness. W. F. Warner and Lucy M. Alexander	260-263
Sodium fluoride, use in eradication of poultry lice	310	STRAKA, ROBERT P.: Fruit Preservation by Freezing Presents Many Problems for Research	527-528
Soil—		Strawberries—	
relation to dry-farming practices	177-178	acreage and production, 1928-1931	737
surveys, progress, discussion by Secretary	75	breeding for new specific-purpose varieties	113-114
types for growing tobacco	370-371	bud formation, influence of temperature and light. George F. Waldo and George M. Darrow	387-389
Soils—		car-lot shipments, 1927-1931	738
research, discussion by Secretary	75-77	prices, farm, 1928-1931	737
tobacco, requirement of secondary fertilizer elements. J. E. McMurtrey, Jr.	545-548	wild, introduction and cultivation	114
types, susceptibility to erosion	346	Straws and stalks, utilization, competition with other materials. F. P. Veitch	521-522
Sorghums—		Stryehning, tolerance of birds	320-327
acreage and production, 1919-1931	656	STUART, WILLIAM: Potato Seed Quality Improved by Tuber-index Method of Selection	304-306
farm value, 1919-1931	656	Suberization, potato seed pieces, for control of seed-corn maggot injury. W. J. Reid, Jr., W. A. Peacock, and R. C. Wright	331-333
prices, farm, 1919-1931	656	Sucrose, recovery from beets, 1911-1931	675
receipts—		Sugar—	
at Kansas City, 1922-1932	657	beet—	
by grades, 1922-1931	657	production, 1909-1931	675-676
yields, 1919-1931	656	world production, 1909-1932	678, 681
South, mechanization, retardation by lack of cotton picking machine. L. A. Reynoldson and B. H. Thibodeaux	428-431	cane—	
Soybean oil—		factories operating, 1911-1931	677
exports—		production, 1909-1931	676-677
1909-1931	880	production in Hawaii, 1913-1931	676
origin, 1927-1931	878	production in Louisiana, 1911-1931	677
production and prices, 1922-1931	749	world production, 1909-1932	678-679, 681
trade, international, 1928-1930	748	companies, distribution of superphosphate	544-545
Soybeans—		corn, status under food and drugs act	88
acreage, yield, and value, 1930-1931	747	exports—	
prices—		1899-1931	561
farm, 1922-1932	747, 748	destination, 1927-1931	872
market, 1922-1931	749	grape, exports, 1899-1931	362
production, 1920-1932	747	imports—	
trade, international, 1928-1930	748	1899-1931	364
Spices, imports, origin, 1927-1931	879	origin, 1927-1931	879
SPLIMAN, H. A.: Perishable Commodities Act Promotes Prompt Settlement of Disputes	290-291	maple—	
Spinach—		prices, 1924-1931	684
acreage and production, 1928-1931	737	production, 1917-1931	684
prices, farm, 1928-1931	737	prices—	
Stalks and straws, utilization, competition with other materials. F. P. Veitch	521-522	retail, 1922-1931	683
STANLEY, LOUISE—		wholesale, 1922-1931	681
Home Economics Research Assists Home Makers to Spend Income Wisely. Louise Stanley	552-553	production—	
Standards for Children's Clothes Stress Comfort, Simplicity, and Self-Help	568	in United States and insular possessions, 1909-1931	676
Staple length, cotton, data, 1928-1931. W. B. Lanham	140-142	trade, and supply available, 1909-1932	680
Starch—		statistics	674-685
exports, 1899-1931	862	trade, international, 1928-1930	682
sweetpotato, yield under new process. R. T. Balch and H. S. Paine	622-624	Sugar-beet—	
State experiment stations, useful work in agricultural engineering. Robert W. Trullinger	351-353	leaf hopper—	
States, cooperation for forestry improvement	81-82	infestation, long-range prediction	112-113
Statistics, agricultural	673-684	source and movement, determination	111-112
STAUBER, B. R.: Average Value Per Acre of Farm Real Estate in United States Was \$48.52 in 1930	474-478	seed balls, disinfection	363
STAUBER, O. J.: Dairy Bulls from Proved Sires Increase Output of Daughters	156-158	Sugar beets—	
STEFFENS, D. E.: Dry Farming in Pacific Northwest is Based on Grain and Clean Fallow	176-177	acreage and production, 1911-1931	674-675
STEVENS, NEIL E.: Plant-Disease Hazards, Though Very Fluctuating, Demand Constant Action	294-297	cross-cultivation method, effect on production costs. A. W. Skuderna	359-362
STICKEL, PAUL W.: Chestnut Lands Planted to Pine Stands Become Valuable in Northeast	127-128	cultivation experiments, description	359
		disease-resistant strains, development	64
		farm value, 1911-1931	363-364
		prices, farm, 1911-1931	674
		production—	
		costs, reduction by new cross-cultivation method. A. W. Skuderna	359-362
		new era result of disease control. G. H. Coons	362-364
		yield per acre, 1911-1931	674-675

	Page
Sunlight, response of pine seedlings in growth and density. Hardy L. Shirley.....	202-204
Superphosphate—	
combination with free ammonia, success as fertilizer. Wm. H. Ross and K. D. Jacob.....	535-537
distribution by beet-sugar companies.....	544-545
superphosphates, research work.....	76
Sweetclover seed—	
acreage, yield, and production, 1929-1931.....	768
prices, farm, 1929-1931.....	768
Sweetpotato storage rots, fluctuation and need of prompt action.....	296, 297
Sweetpotatoes—	
acreage and production, 1924-1931.....	734-735
car-lot shipments, 1921-1931.....	736
farm value, 1919-1931.....	735
prices, farm, 1919-1931.....	735, 736
starch yield under new process. R. T. Balch and H. S. Paine.....	522-524
yields, 1919-1931.....	735
SWENSON, T. L.: Eggs Oiled by Vacuum Carbon Dioxide Method Keep Better in Storage. With Lawrence H. James.....	184-185
Swine—	
consumption of earthworms cause of lung-worm infestation. Benjamin Schwartz.....	364-366
infestation by lungworms, control.....	366
<i>See also</i> Hogs; Pigs.	
SWINGLE, WALTER T.: Date Industry of U. S. Is an Example of New, Noncompetitive Crop.....	165-167
SWITZER, H. B.: Milk and Cream Imports Raised in Quality by Federal-Control Law.....	272-273
TAPPE, V. F.—	
Wheat Loose-Smut Infection Prevented by Arid Climate.....	397-398
Wheat Strains Resistant to Flag Smut Afford Best Means of Control.....	401-403
Tariff, influence on agriculture, discussion by Secretary.....	9-10
Taxes—	
farm—	
discussion by Secretary.....	42-43
real estate, 1924-1930.....	903
gasoline, 1930.....	911
State and local, recommended changes.....	453-459
Tees—	
imports—	
1899-1931.....	863
origin, 1927-1931.....	879
trade, international, 1925-1930.....	884
Temperature—	
and light, influence on strawberry-bud formation. George F. Waldo and George M. Darrow.....	857-859
effect on whipping quality of cream.....	155-156
selected points, by months, 1931.....	914-915
Tenancy, farm, increase—	
1920-1930. O. M. Johnson.....	491-495
discussion by Secretary.....	42
Tenants, operation of farms, increase, 1920-1930.....	494-495
Terminals, for distribution of fruit and vegetable, description.....	233-236
Terraces, requirements in special machinery.....	447-448, 449
Taster, tenderness, for canned goods, aid in enforcement of food law. W. B. White.....	366-368
Texas, beef cattle, finishing by supplementing pasture, increase. John H. Jones.....	102-103
THEODORAU, B. H.: Mechanization in South Has Been Retarded by Lack of a Cotton Picking Machine. With L. A. Reynolds.....	428-431
THIEME, FRED E.: Trail Builder Developed for Use in Constructing National Forest Roads.....	376-377
THORNE, GERALD: Alfalfa-Stem Nematode Causing Severe Damage in Some Western Areas.....	99-101
Tick, cattle, eradication status, 1931.....	731

Tillage—	
implements, new types, designs and use. G. A. Cummings.....	441-445
methods, use by wheat growers in central Great Plains. A. L. Halsted.....	303-304
<i>Tilletia</i> spp., cause of bunt of wheat.....	302-303
Timber—	
free-use, cut from national forests.....	928
national forest, management and yield.....	222
survey of farm woodlands, importance. C. M. Granger.....	409-410
Timothy seed—	
acreage, yield, and production, 1929-1931.....	767
prices, farm, 1929-1931.....	767, 768
receipts at Chicago, 1922-1932.....	768
TITUS, HARRY W.: Chick Leg Weakness May Be Prevented by Special Attention to the Feed.....	128-129
Tobacco—	
acreage, 1890-1931.....	680-689
air-curing methods, results.....	371
culture, growing and curing methods, need of improvement. W. W. Garner.....	370-371
diseases, prevention and control.....	371
exports—	
1890-1931.....	686, 694, 692
destination, 1927-1931.....	872
farm value, 1890-1931.....	686
grading, and market news, aid in promotion of fairer auction system. Frank B. Wilkerson.....	372-373
Imports—	
1890-1931.....	686
origin, 1927-1931.....	879
market news and grading, aid in promotion of fairer auction system. Frank B. Wilkerson.....	372-373
Prices, farm, 1890-1931.....	686, 687, 690-692
Production—	
1890-1931.....	686-692
in 1931.....	22
soils, requirement of secondary fertilizer elements. J. E. McMurtrey, Jr.....	545-548
statistics.....	686-694
stocks on hand, 1927-1931.....	690-693
stored, injury by new pest.....	70
trade, international, 1925-1930.....	694
unmanufactured, imports, 1899-1931.....	863
yields, 1890-1931.....	686, 687-690
Tomato, Break o' Day variety, success in tests. William S. Porte.....	373-376
Tomatoes—	
acreage, 1929-1931.....	739
canned, pack in United States, 1918-1931.....	740
car-lot shipments, 1920-1931.....	740
exports, 1923-1931.....	738
fresh, imports, 1899-1931.....	863
imports, 1923-1931.....	738
prices, farm, 1928-1931.....	739
production, 1923-1931.....	738, 739
TOOLS, E. H.: Seed-Testing Service Protects Farmer in Case of Many Principal Crops. With E. Brown and F. H. Hillman.....	333-335
Tractor—	
adaptation to various farm operations. B. B. Gray.....	437-441
development, survey.....	437-441
Tractors—	
development and efficiency.....	351-352
on Corn-Belt farms, numbers and use.....	423
on Great Plains, increase in use after World War.....	418
utilization in central Asia.....	148-144
Trade, foreign. <i>See also</i> Exports; Imports.	
Trail builder, use in construction of national forest roads. Fred E. Thieme.....	376-377
Transportation—	
fruits and vegetables, facilities.....	285-286
perishables, benefits of perishable commodities act.....	290-291
system, planning of, need for forest-fire protection. T. W. Norcross.....	218-220
Trench silt, with drainage provisions, success in humid areas. S. W. Greene.....	378-381

	Page		Page
TRIMBLE, CHAS. S.: Renovated-Butter Industry Declines with Decrease in Production of Farm Butter.....	320-321	Veterinary remedies, fraudulent, surveillance.....	89
Truck crops. See under specific crops.		VIERMONT, BESS M.: Cotton Is Utilized as New Foundation Material for Making Hooked Rugs.....	558-560
TRULLINGER, ROBERT W.: State Experiment Stations Win Useful Results in Agricultural Engineering.....	351-353	VINALL, H. N.: Pasture Lands of U. S. Vary Regionally in Main Characteristics. With C. R. Enlow.....	280-284
Tuber index, method of potato-seed selection. William Stuart.....	304-306	Vitamin content of foods, measurement by tests with rats. Hazel E. Munsell.....	506-507
Tuberculosis—		VOLIN, L.: Cotton Exports to Russia Decline as Acreage and Output There Increase.....	142-145
livestock, eradication progress.....	57-58	Wages, farm, index numbers, 1910-1931.....	902, 903
serious menace to poultry industry. Elmer Lash.....	381-383	WALDO, GEORGE F.—	
Turkestan, cotton production.....	142-143, 145	Berry Breeders Seek New Varieties Adapted to Specific Purposes. With George M. Darrow.....	113-114
Turkeys—		Strawberry-Bud Formation Is Favorably Influenced by Temperature and Light. With George M. Darrow.....	357-359
diseases, control studies.....	189-190	WALES, H. BASIL: Reforestation Work in Lake States Aided by Knutson-Vandenberg Act.....	317-320
live, prices, farm, 1912-1931.....	852	WALKER, J. C.: Cabbage Variety, Jersey Queen, Adds Early Strain Resistant to Yellows.....	119-121
TURNER, HOWARD A.: Farms Fewer but Larger in 1930 than in 1920: Crop Area per Farm Increased.....	487-491	WALL, NORMAN J.—	
TURNER, R. A.: Forestry 4-H Clubs Carry on Broad Program in the Central States.....	230-231	Intermediate Credit Facilities Capable of Substantial Expansion. With Fred L. Garlock.....	505-507
Turnip sauerkraut, preparation.....	383-384	Total Indebtedness of United States Farmers Estimated at 13 to 14 Billions.....	501-503
Turnips, conversion into sauerkraut, by cabbage method. Harry E. Goresline.....	383-384	Walnuts—	
Turpentine—		imports, origin, 1927-1931.....	878
and rosin, essentials for numerous industries. F. P. Veitch and W. C. Smith.....	384-385	prices, farm, 1922-1931.....	741
consumption, 1928-1930.....	928	production and value, 1922-1931.....	741
exports, 1909-1931.....	860	shelled imports, 1899-1931.....	884
operators, benefits of forestry demonstration. Joseph C. Kircher.....	385-386	WARNER, K. F.: Lamb Becomes More Tender When Ripened by Period of Storage. With Lucy M. Alexander.....	260-263
uses in industry.....	384-385	Water, use in fighting forest fires in California. Walter E. Jotter.....	220-222
TURRENTINE, J. W.: Fertilizer Sources Ample for Midwest, Cost Cut by Higher Concentration.....	533-535	Waterfowl—	
Tylenchus dipaei. See Alfalfa-stem nematode.		breeding grounds, drought conditions.....	83
Unemployment relief, discussion by Secretary.....	49-51	hunting season, changes.....	83
Value, farm. See under specific crop, farm value.		See also Wild life.	
Vat, dipping, octagonal, construction, advantages, and use.....	122-124	Watermelons—	
Vats, cattle-dipping, of octagonal shape, success in Nevada. L. C. Butterfield.....	122-124	acreage and production, 1928-1931.....	741
Veal—		car-load shipments, 1921-1931.....	741
imports, 1899-1931.....	863	prices, farm, 1928-1931.....	741
prices, wholesale, 1929-1931.....	816	prices, market, 1924-1931.....	741
Vegetable—		Weather Bureau, work, review by Secretary.....	96-97
and fruit situation, discussion by Secretary.....	33-34	Weed seed, content in crop seed.....	834
oils. See Oils, vegetable.		Weeders, new types, use.....	445
products—		Weeds, farm, chemical utilization.....	516
exports and imports, value, 1928-1931.....	859	Weights, equivalent measures.....	576
exports, destination, 1927-1931.....	866-872	WELLS, ORIS V.: Mechanization Affects Both Supply of and Demand for Agriculture's Products.....	415-417
imports, origin, 1927-1931.....	874-879	Wheat—	
varieties, development, discussion by Secretary.....	64	acreage—	
Vegetables—		1929 and 1919.....	485
and fruits—		and production, 1849, 1859, 1866-1931.....	577-582, 584-585
distribution by depots in big city markets. Wendell Calhoun.....	233-236	attack by three smuts, distribution. J. A. Faris.....	394-397
freezing for preservation, status. H. C. Diehl.....	524-527	breeding for resistance to some strains of bunt, susceptibility to other strains. H. H. Flor.....	392-393
canned, grading service, official, inauguration. Paul M. Williams.....	274-275	consumption and importation in China.....	132-133
growing in Great Plains valleys, favorable conditions. M. F. Babb.....	387-389	cost of production by yield groups, 1930.....	896
production in 1931.....	23	deterioration in farm storage bin, experimental tests. John H. Cox.....	404-406
standardization and variety description, progress of project. Victor R. Boswell.....	389-392	exports—	
statistics.....	685-743	1849, 1859, 1866-1932.....	577-578, 591, 592
unloads at markets, 1924-1931.....	742-743	destination, 1927-1931.....	870
VERRILL, F. P.—		farm value, 1866-1931.....	577-578, 589
Turpentine and Rosin Supply Essentials for Numerous Industries. With W. C. Smith.....	384-385	farming, semiabsentee-operator system.....	420
Utilization of Straws and Stalks Lags as Other Materials Compete.....	521-522	flag smut. See Smut, flag.	
Velvetbeans—		futures trading, 1923-1931.....	597, 598
acreage and production, 1929-1931.....	751	growers, central Great Plains, use of three main tillage methods. A. L. Hallett.....	393-394
prices, farm, 1929-1931.....	751	imports—	
yields, 1929-1931.....	751	1849, 1859, 1866-1931.....	577-578
VENSEN, W. J.: Cheese Production Is Still Largely Confined to a Few Areas in U. S.	124-127	origin, 1927-1931.....	876
		restrictions.....	213-215

	Page		Page
Wheat—Continued.		WILLIAMS, PAUL M.: Official Grading Service for Canned Fruits and Vegetables Inaugurated	274-275
loose-smut infection, prevention by arid climate. V. F. Tapke	397-398	WILSON, H. L.: Cottage-Cheese Industry Could Be Expanded with Advantage in Some Areas	137-138
losses—		WILSON, M. C.: Home-Demonstration Work Influences Farm Women, Survey Shows	248-249
caused by stinking smut	354-357	Wiltshire sides—	
from stinking smut, reduction by seed disinfection. R. W. Leukel	398-401	exports, English requirements. R. L. Hiner	406-409
marketings by farmers, 1921-1931	587	preparation for English markets	406-409
pools, number and quantity of wheat handled, 1921-1929	950	WINSTON, J. R.: Citrus Fruit Coloring by Ethylene Process Much Improved Lately	134-137
prices—		Wintering, beef—	
farm, 1896-1931	577-578, 589, 593	cattle, on range in northern Great Plains.	
market, 1922-1924, 1931-32	583, 591, 593-595	A. L. Baker	103-106
production and farm disposition, 1924-1930	589	cows, recommendations	106-107
receipts—		Wood—	
at markets, 1922-1931	587	lot, logs, selling profitably on a log-grade basis. Ray Miller	266-267
by classes, 1926-1931	588	pulp production, 1908, 1919, 1929, 1930	925
seed, disinfection for reduction of loss from stinking smut. R. W. Leukel	398-401	weathering, of farm buildings, repainting.	
stocks in store, 1926-1932	589	F. L. Browne	196-197
storage, drying experiments	405-406	Woodlands, farm, importance as factor in timber survey. C. M. Granger	409-410
strains resistant to flag smut, development as means of control. V. F. Tapke	401-403	Wool—	
supply and distribution, 1899-1932	590	amount available for consumption, 1910-1931	811
trade, international, 1925-1931	592	consumption and prices, discussion by Secretary	30
value in dry-land farming	174-175	imports—	
visible supply, 1922-1932	588	and exports, 1910-1931	811
world—		origin, 1927-1931	873-874
production, 1890-1932	586	prices—	
situation, discussion by Secretary	23-25	farm, 1922-1931	812
yields, 1896-1931	577-589, 593-595	market, 1922-1931	811, 812
Wheats, breeding for smut resistance combined with yield and quality. J. Allen Clarke	408-404	production, 1925-1931	807-808, 810-811
WHITE, W. B.: Tenderness Tester for Canned Goods Aids in Food Law Enforcement	366-368	trade, international, 1925-1930	809
WHITE, WILLIAM: Butter Stored in 1-Pound Prints Keeps as Well as if Stored in 64-Pound Tubs	118-119	unmanufactured, imports, 1899-1931	863
WICKENS, DAVID L.—		World influences upon American agriculture, report by Secretary Hyde	1-98
Merchant Credit Important in Farm Finance, But May Help or Harm the Farmer. With Burton D. Seeley	508-505	WRIGHT, R. C.: Seed-Corn Maggot Injury Avoided by Suberizing Potato Seed Pieces before Planting. With W. J. Reid, jr., and W. M. Peacock	331-333
Mortgage Credit Use Requires Close Study of Long-Term Factors	509-512	YOUNG, STANLEY P.: Predatory-Animal and Rodent Control to be Conducted under a 10-Year Program	312-315
Wild life, conservation and propagation	82-85	ZELLER, J. H.: Pigs Produce Pork More Efficiently on Limited Feed Levels. With N. R. Ellis	291-292
WILKERSON, FRANK B.: Tobacco Grading and Market News Promote Fairer Auction System	372-373		
WILLIAMS, FAITH M.: Family Living Standards Depend on Use as Well as on Size of Income	549-551		



